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THE PLANT DISEASE REPORTER

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The Plant Disease Survey

Bean — p. 184-190
Bact. phas.
Bact. flacc.
Mosaic
Root & stem rot
(Fusarium)
Root rot & canker
(Rhizoctonia)
Rust
(Uromyces
appendiculatus
Stem blight
(Macrophoma
phaseoli)
Southern wilt
(Sclerotium
Rolfsii)

Lima bean
Bact. spot
(Bact. viridifaciens
et al.

Supplement 34

Diseases of Field and Vegetable Crops
in the United States in 1923
July 15, 1924

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

DISEASES OF FIELD AND VEGETABLE CROPS IN THE UNITED STATES IN 1923

Prepared by R. E. Vaughan
Collaborator with the Plant Disease Survey and
Associate Professor of Plant Pathology, University of Wisconsin.

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The discussion of field and vegetable crop diseases which follows is summarized from reports sent to the Plant Disease Survey by collaborators from the various states, contributed by various members of the staff of the Bureau of Plant Industry, and gleaned from current literature. When few or scattering reports are submitted the resulting summary must necessarily be disappointing. It so happens that collaborators often pass by some of the common and widespread diseases with brief, if any, mention, which causes the summary to be more or less fragmentary. In some states the time of collaborators is so completely occupied with experiment station or teaching work that little opportunity is available for the Plant Disease Survey. It is much to be desired that more numerous and complete reports may be received next year.

OUTSTANDING OBSERVATIONS

The most outstanding observation of the season is undoubtedly the almost entire absence of potato late blight in all the major potato producing states if tbe country. At one time there was considerable Phytophthora infestans on the potato foliage in Florida, but the economic loss from rot from this source was very minor. This is an illustration of the dependence of crop diseases, as well as the crops themselves, upon the conditions of environment under which they are grown. This point may be further illustrated by the considerable loss from downy mildew caused by Peronospora effusa which occurred in Connecticut, Long Island, and New Jersey trucking districts following the excessive rains the first week in June. After the rain the spinach tissues were soft and conditions highly favorable for rapid growth and spread of the fungus. The conditions of temperature and light as well as moisture are important in determining whether a disease will develop from minor to major proportions or the reverse. Goss of Nebraska reports that potato mosaic was made evident in early season by heavy rainfall, low temperature, and deficient sunlight, while following mid-summer conditions there was little mosaic to be seen. The various Fusarium diseases have long been associated with high temperature, while tobacco black root rot is favored by cool conditions.

Diseases reported from new states in 1923
(For details see text)

POTATO - Heterodera radicicola, Kansas (found in the field for the first time)
- Rhizoctonia crocorum, New York
- Spindle tuber, Vermont
- Verticillium alboatrum, Connecticut
- Yellow dwarf, Florida

TOMATO - Bacterium vesicatorium, Missouri
- Cladosporium fulvum, Kansas (found in the field for the first time)
- Fusarium lycopersici, Minnesota (said to be the first authentic record of its occurrence)
- Phytophthora terrestris, West Virginia

SWEET POTATO - "Mosaic", Kansas
Sclerotinia sp., New Jersey
Sclerotium rolfsii, New Jersey

BEAN - *Bacterium flaccumfaciens*, Michigan, Montana, Maryland, District of Columbia; France; Germany; (previously reported only from South Dakota)
Fusarium sp. (dry rootrot), Washington

LIMA BEAN - *Diaporthe phaseolorum*, Mississippi
Nematospora phaseoli, Illinois

ONION - *Urocystis cepulae*, Minnesota

CABBAGE & KALE - *Fusarium conglutinans*, California

RADISH - *Mucor* sp. (damping-off) Connecticut

CANTALOUPE - *Cladosporium cucumerinum*, Delaware
Septoria cucurbitacearum, Delaware
Pseudoperonospora cubensis, California

CUCUMBER - *Septoria cucurbitacearum*, Delaware

PUMPKIN - *Cercospora cucurbitae*, Delaware
Colletotrichum lagenarium, Delaware

SQUASH - *Bacillus tracheiphilus*, Kansas

COTTON - *Bacterium malvacearum*, Illinois

TOBACCO - *Bacterium tabacum*, Illinois

ASPARAGUS - *Cercospora* sp., California

RHUBARB - *Phyllosticta straminella*, Kansas
Phytophthora cactorum, Michigan
Phytophthora parasitica rhei, Delaware
Phytophthora, species undetermined, Missouri

New diseases, 1923
(For details see text)

TOMATO - *Olpidium brassicae*, on roots, greenhouse, University of Wisconsin (new to this country)
Oospora lactis parasitica, new variety in the vicinity of Arlington, Va., and Washington, D. C., and on fruit shipped from the Gulf States.
Phytophthora mexicana, new species, on fruit shipped from Mexico

SWEET POTATO - *Cercospora batatae*, Florida (new to this country)
Mottle necrosis and internal breakdown

LIMA BEAN - *Bacterium viridifaciens*, n. sp., described from Wisconsin: reported by collaborators from New York and Indiana

ONION - *Cercospora duddiae*, n. sp., Philippine Islands
Sclerotium cepivorum, Virginia (only one other authentic report of its occurrence in this country - from Oregon in 1918)

CABBAGE - *Olpidium brassicae* (see tomato)

LETTUCE - *Cercospora lactucae* n. sp., Philippine Islands

PEA - *Fusarium martii* pisi n. var., general
Fusicladium sp. and *Phyllosticta* sp. causing black leaf, Utah

TOBACCO - *Bacterium melleum*, n. sp., Kentucky, Wisconsin
Olpidium brassicae (see tomato)

SPINACH - *Fusarium spinaciae* n. sp., Idaho
Fusarium sp., Texas

New hosts of previously described organisms

Bacterium malvacearum - Arizona wild cotton, *Thurberia thespesioides* (inoculation)

Bacterium solanacearum found on tango (*Chrysanthemum coronarium*), Philippine Islands

Bacterium tabacum found on Lima bean, Massachusetts

Entyloma australe found on Physalis pruinosa, New York (not previously reported on this species)

Sclerotinia libertiana on udo (*Aralia cordata*)

Verticillium alboatrum on udo

DISEASES OF POTATO

Potato seed treatment

The following are some of the more important papers on this subject issued during the past year.

Bisby, G. R. Potato seed tests in Manitoba. (Abstract) Phytopath. 14: 58. January 1924.

Blodgett, F. M. Time-temperature curves for killing potato tubers by heat treatments. Phytopath. 13: 465-475. November 1923.

Claus, Eugen, Gustav, Köck, und Erwin Janchen. Neuere Erfahrungen über den Einfluss von Uspulun und Uspulunbolus auf die Kartoffelerträge. (Recent experiments on the effect of Uspulun and Uspulunbolus on the yield of potatoes.) Oesterreich Zeitschr. Kartoffelbau 2: 29-30. February 17, 1923. Results of 4 tests.

Gilman, J. C. and J. E. Melhus. Further studies on potato treatment. Phytopath. 13 341-358. August 1923.

White, R. P. Loss of strength of mercuric chloride solutions used for treating potatoes. (Abstract) Phytopath. 14:58. January 1924.

Potato spraying

Spraying, recognized as one of the necessary practices in connection with raising potatoes, is discussed in the following references.

Recent literature:

Chittenden, F. H. and W. A. Orton. Increasing the potato crop by spraying. U. S. Dept. Agr. Farm. Bul. 1349: 1-22. 1923.

Cook, F. C. The influence of copper sprays on the yield and composition of Irish potato tubers. U. S. Dept. Agr. Bul. 1146: 1-27. April 5, 1923.

Evidence is presented to show that Bordeaux and other copper sprays increased the starch and nitrogen constituents of the potato tubers and consequently made them more valuable for food and industrial purposes.

Leach, J. G. Spraying vs. dusting for potatoes. (Abstract) Phytopath. 14: 57. January 1924.

Martin, W. H. Ten years of potato spraying in New Jersey. New Jersey Agr. Exp. Sta. Bul. 383: 1-32. April 1923.

Rosa, J. T., Jr. Note on an indirect effect of spraying potatoes with Bordeaux mixture. Amer. Jour. Bot. 10: 113-116. 1923.

Early Ohio variety sprayed with Bordeaux remained green 3 weeks longer, and yielded over one-third more than control plants. The quality of the increased yield was depreciated because of marked development of knobby second growth.

Rosa, J. T., Jr. Spraying Irish potatoes. Missouri Agr. Exp. Sta. Bul. 198: 1-6. 1923.

Potato seed certification

The practice of seed certification continues to give satisfaction. It provides one of the best ways known for the location of strains of seed relatively free from dangerous diseases.

Recent literature:

Brown, B. A. & W. L. Slate. Studies on certified seed potatoes. Connecticut Agr. Exp. Sta. Bul. 114: 265-296. May 1923.

Partridge, George. Potato inspection and certification in Canada, 1922. Agr. Gaz. Canada 10: 121-123. March - April 1923.

Late blight caused by Phytophthora infestans (Mont.) DeBary

The whole country was remarkably free from late blight in 1923. At one time it was quite prevalent on the foliage in Florida, but caused little rot at digging time. The occurrence of late blight was noted by collaborators in Maine, New Hampshire, Vermont, Massachusetts, New York, Pennsylvania, Maryland, West Virginia, North Carolina, Florida, Alabama, Michigan, Wisconsin, Arizona, and at high altitudes in California. States where late blight sometimes occurs but which gave a negative report this year are: Rhode Island, Connecticut, New Jersey, Ohio, and Iowa.

Table 17. Dates of earliest appearance of late blight in 1923, according to collaborators.

Date	Place	Date	Place
Feb. 20	Federal Point, Fla.	Aug. 30	Mountain Section, W. Va.
July 15	Somerset County, Penn.	Sept. 10	Colebrook, N. H.
July 18	Newland, N. Car.	Sept. 26	Phillips, Wis.
Aug. 2	Middlesex Co., Mass.	Oct. 1	Caro, Mich.
Aug. 30	Wyoming Co., N. Y.		
Aug. 30	Maine		

The dry weather which prevailed throughout the country in midsummer is given by collaborators as the probable explanation for the minor importance of late blight. Giddings (West Virginia) reports that there was plenty of rain but that the rainy periods were followed by hot, sunny weather which nullified the effect of rain. In many instances the rains did not come until the crop was nearly mature and beyond the period of injury.

In the potato spraying work reported from New Hampshire, (1) experiments were conducted on the effect of pressure and number of nozzles used in the control of late blight. Bordeaux 8-4-50 was applied four times at intervals of two weeks. Late blight did not develop, so no data were obtained. It was noted that neither the number of nozzles used nor the amount of mixture applied per acre had any stimulating effect on the yield of the plants.

The Rhode Island Experiment Station, (2) reports that plats dusted with

Bordeaux yielded only about 70 per cent of those where the fungicide was applied as a spray.

Recent literature:

Cited

1. Butler, O. Spraying potatoes. New Hampshire Agr. Exp. Sta. Bul. 208: 1-24. 1923.
2. Anon. Spray v. dust for potato blight. Rhode Island Agr. Exp. Sta. Bul. 193: 1-4. 1923.

Not cited

Kursanov, Leo. The history and present situation of the study of Phytophthora infestans. Trav. Sect. Mycol. et Phytopath. Soc. Bot. Russie. 1: 107-116. 1923. In Russian.

Martin, W. H. Late blight of potatoes and the weather. New Jersey Agr. Exp. Sta. Bul. 384. p. 25. 1923.

Uppal, B. N. Spore germination of *Phytophthora infestans*. (Abstract) Phytopath. 14: 32-33. January 1924.

Early blight caused by *Macrosporium solani* E. & M.

Early blight was present throughout the country but in only one section, namely North and South Carolina, was the loss more than nominal, being 5% in North Carolina and 10% in South Carolina. This disease was reported as relatively more prevalent than last year in Delaware, South Carolina, Indiana, Illinois, Iowa, South Dakota, Utah, and Idaho. It was reported the same in Maryland and less prevalent than last year in Maine, Connecticut, New York, West Virginia, Kentucky, Wisconsin, Minnesota, and Kansas. It seems to be coextensive with the crop but does not appear until the tubers are approaching maturity, hence is of minor importance.

Potatoes

Table 18 Dates of earliest recorded appearance of early blight, 1923.

Date	Place	Date	Place
Mar. 30	Florida	July 30	South Dakota
May 7	Chestertown, S. C.	Aug. 1	Lake of the woods, Minn.
May 22	Baton Rouge, La.	Aug. 11	Oneida Co., Wis.
May 30	Graham Co., Ariz.	Aug. 24	Traill Co., N. D.
June 5	Duplin Co., N. C.	Aug. 29	Essex Co., N. Y.
June 12	Hamilton Co., Ill.	Sept. 1	New Hampshire
June 19	Newark, Del.	Sept. 1	Vermont
July 20	Middletown, Conn.	Sept. 25	Kentucky

Martin, of New Jersey, considered that the drought of midsummer was responsible for the relatively small losses due to the early blight.

The Early Ohio variety was mentioned by Weniger, North Dakota, as being most seriously infected.

Literature

Whetzel, H. H. The Alternaria blight of potatoes in Bermuda. Phytopath. 13: 100-103. March 1923. No. 3.

Common scab caused by Actinomyces scabies (Thax.) Güssow

Common scab, as usual, is one of the most widespread diseases reported on potatoes. The losses caused by it are due to disfigured and unsalable tubers rather than an actual reduction in quantity. The dates of first appearance are coincident with harvesting of the crop.

Dry soil conditions are given as favoring the development of common scab in New York, New Jersey, Kentucky, Wisconsin, and Minnesota. This is in conformity with the results of experiments reported by G. B. Sanford from the University of Minnesota and the University of Alberta, Canada.

An interesting varietal susceptibility test is reported by W. H. Martin, New Jersey. Tubers were planted on scab infested soil and gave clean tubers as follows: Giant, 62.6%; Burbank, 61.8%; Russet Rural, 57.1%; No. 9, 50.6%; Rural New Yorker, 50.4%; Irish Cobbler, 21.5%, and Green Mountain, only 6.2%. Tehon of Illinois reports Early Ohio highly susceptible.

The results of the application of sulfur for a number of years as it was used on three farms in Kentucky, were reported by J. S. Gardner and are given in the following table.

Table 19. Results of the use of sulfur as an agent in common scab control.

Date	Treatment on first farm	Results
1915	Limed 2 tons per acre for clover	
1917	--	Potatoes 100% unsalable
1919	--	" " "
1922	July; inoc. sulfur, 150 lbs. per acre	No benefit
1923	Feb. or Mar.; inoc. sulfur 150 lbs. per acre	Improvement in control but might have been season.
1923	June or July; spraying sulfur, 150 lbs. per acre.	2nd crop practically clean in a bad scab season, but yield reduced about 20%
	Second farm	Results
1922	July; 150 lbs., 300 lbs., 450 lbs., 600 lbs. per acre applied to 4 plots	Slight control with 600 lbs. in fall crop
1923	--	Marked improvement on all 4 plots, no exact data.

Date	Third farm	Results
1921	15 lbs. sulfur to 30 ft. spot	
1922	15 lbs. " "	No control
1923	15 lbs. " " "	No scab

Martin, New Jersey, reports on a test with 600 pounds of sulfur broadcasted, where the amount of common scab was reduced from 84 per cent unsalable in the check to 22.5 per cent unsalable in the treated portion. He has also reported (1) that sulfate of ammonia helps to control scab, while nitrate of soda increased the amount of scab.

Literature

Cited

1. Martin, W. H. Potato fertilizer and scab. New Jersey State Potato Assoc. Hints to Potato Growers. No. 6. October 1923.

Not Cited:

DeLong, W. A. Sulfur and soil acidity. Sci. Agr. 3: 354-356. 1923.

Geise, F. W. Experiments with inoculated sulfur. Preliminary report, VirginiaTruck Exp. Sta. Bul. 42: 259-263. 1923.

"The relative amount of scab control varied in different tests. This may be attributed to varying soil conditions. In view of the harmful residual effect on subsequent crops resulting from the use of excessive amounts of inoculated sulfur, it is believed that on the basis of data obtained with soy beans, spinach, corn and late potatoes, only quantities not exceeding 300 lbs. per acre should be used during any one season on the same land under soil conditions and crop rotation systems prevailing in eastern Virginia." (Exp. Sta. Record 49. Sept. 1923)

Leach, Julian G. and R. C. Rose. Experiments with inoculated sulfur for scab control. (Abstract) Phytopath. 14: 57. January 1924.

Variable results obtained. In few cases an appreciable reduction of scab, in majority of cases little or no control could be detected. In many places there was a decreased yield. The type of soil seems to have much influence on the effectiveness of the treatment.

Lutman, B. F. Potato scab in new land. Phytopath. 12: 241-244. May 1923.

Scab developed on new soil planted with disinfected tubers. Poured agar plate cultures from the soil showed organisms of the Actinomyces chromogenus type. Conclusion: the scab organism is generally saprophytic on cellulose matter in the soil and the parasitism on potatoes is merely secondary.

Martin, W. H. Reduce potato scab - use acid fertilizer. New Jersey Agric. 5: No. 12: 6-7. Dec. 1923.

Millard, W. A. Common scab of potatoes II. Ann. Appl. Biol. 10: 70-88. Feb. 1923. States: Preferential food hypothesis: "According to this theory, the scab organisms are primarily saprophytic living on vegetable remains in the soil. They remain so until their natural food supply is exhausted and develop their parasitic tendencies only under the stress of hunger." Scab organism strongly aerobic, which fact explains decreased amount of disease in wet seasons due to wet soils. (Abst. Rev. Appl. Myc. 2: 519. Nov. 1923).

Sanford, G. B. The relation of soil moisture to the development of common scab of potato. Phytopath. 13: 231-236. 1923.

Sanford, G. B. Some factors influencing the development of potato scab. (Abstract) Phytopath. 14: 58-59. Jan. 1924.

____________ The potato scab problem. Proc. West. Can. Soc. Agr. 2: 71-81. 1922.

Blackleg caused by Bacillus phytophthorus Appel

The amount of blackleg in 1923 was less than the previous season as is shown by the following report from collaborators.

Table 20. Losses due to blackleg 1922 and 1923.

State	Percentage loss		State	Percentage loss	
	1922	1923		1922	1923
Maine	1	trace	Ind.	trace	trace
Vt.	1	trace	Wis.	trace	trace
Conn.	.5	0	Minn.	2	1
N. Y.	trace	trace	N. D.	3	2
Pa.	2	trace	S. D.	trace	trace
Md.	1	1	Kans.	3	trace
W. Va.	trace	0	Utah	2.5	1.5
Va.	2	-	Idaho	.5	.5
Tenn.	1	-	Wash.	trace	trace

The following losses were reported in 1923 from states that did not report the disease in 1922.

1.5% - North Carolina
1% - Florida
0.1% - California
Trace - New Hampshire, New Jersey, Arkansas, Illinois, Michigan, Iowa, Missouri, Arizona, Nevada.

It is the consensus of opinion that the summer drought was instrumental in checking losses from blackleg. The disease was reported from the following states on the dates given:

May 10.......North Carolina
May 1........Arizona
June 1.......New Jersey
June 10......Kansas
June 11......New York
June 18........Illinois
June 20........Indiana
July 1.........New Hampshire
July 30........South Dakota
August 5.......Wisconsin

The control of blackleg is reported on by Miss Weniger of North Dakota, as follows:

> Indications are that treating after cutting is responsible for better control of the disease. Growers are thus able to detect infected tubers, discard them and further disinfect the surfaces of cut tubers which might be contaminated. Counties where treating has been practiced before cutting have not had as good control of blackleg as in those where treating follows cutting of the seed pieces.

Literature

Jennison, H. M. Potato blackleg with special reference to the etiological agent. Ann. Missouri Bot. Gard. 10: 1-72. February 1923. Abstract of above given in Pl. Dis. Bul. Supplement 26: 30. 1923.

Paine. S. G. & H. Chadhuri. The blackleg disease of the potato. On the relationship of Bacillus atrosepticus and Bacillus solanisaprus. Phytopath. 13: 359-361. Aug. 1923. Experiments clearly establish the two organisms as distinct.

Stem rot and black scurf caused by Rhizoctonia solani Kuhn (Corticium vagum DC.)

Rhizoctonia continues to be one of the most widespread diseases of potato. It produced, in general, smaller losses in 1923 than in 1922 as indicated in the following table comparing the two years. Exceptions to this statement are Maryland, Minnesota, and Iowa, where an increase occurred, and in New York, Michigan and North Dakota where it caused the same loss in both years.

Table 21. Losses caused by Rhizoctonia in 1922 and 1923.

State	Percentage of loss		State	Percentage of loss	
	1922	1923		1922	1923
New York	5	5	Iowa	2	4
New Jersey	trace	trace	North Dakota	3	3
Maryland	2	3	South Dakota	3	1
Pennsylvania	3	trace	Kansas	15	12.5
Florida	trace	-1	Arizona	5	1
Indiana	trace	.1	Utah	4	2.5
Michigan	5	5	Idaho	8	5
Wisconsin	2	1	Washington	8	2
Minnesota	2	3			

Damage from this disease occurs to underground parts soon after the tubers are planted and may come from either tuber or soil infection. Where potatoes are planted in cool soil, either in the northern section of the country or in the mountain region of the South and West, more damage is found than where potatoes are planted in warmer soil. Richards, of Utah, notes a loss of 50% in 1918, when the June mean temperature was 20.1°C as contrasted with 15.4% loss in 1919, when the June mean temperature was 23°. The critical temperature seems to be about 21°C.

No observations were made regarding resistance or susceptibility of different varieties of potatoes to the Rhizoctonia diseases. (1)

The control of Rhizoctonia is usually brought about by treating the seed with corrosive sublimate. Hot formaldehyde treatment is recommended in Iowa. Where the soil is infected, treatment is of reduced value. The use of hot corrosive sublimate is being used to some extent in New York.

Literature

Cited

1. Richards, B. L. Further studies on the pathogenicity of Corticium vagum on the potato as affected by soil temperature. Jour. Agr. Res. 23: 761-770. 1923.

Not Cited

Dorst, J. C. Aantosting van de aardappelplant door Rhizoctonia solani en haar bestrijding door sublimaat. (Rhizoctonia solani on potato and its control with sublimate) Tijdschr. Plantenz. 29: 97-106. June 1923. (Abst. Rev. Appl. Myc. 2: 572. Dec. 1923 and Bot. Abst. 13: entry 310. Jan. 1924.)

The disease is stated to be very prevalent on sandy clay soil and on reclaimed pasture land in Holland. There is a tendency to form aerial tubers in latter soil type. Applications of fresh organic manure appear to increase the disease. Eradication of the causal organism from the soil can only be gradually accomplished by suitable crop rotation, by the removal of weeds, and potato refuse, and by seed disinfection with corrosive sublimate (1%) for 1 1/2 hours. The temperature of the water should not be lower than 5°C or tuber injury may result.

Matsumato, Takashi. Further studies on physiology of Rhizoctonia solani Kühn. Bul. Imp. Coll. Agr. & For. Morioka, Japan. 5: 64. Jan. 1923.

Müller, K. O. Ueber die Beziehungen zwischen Rhizoctonia solani Kühn und Hypochnus solani Prill. et Del. (On the relations between Rhizoctonia solani Kühn and Hypochnus solani Prill. & Del.) -- Arb. Biol. Reichanst. furLand. und Forstwirtsch. 11: 326-330. 1923. (Abst. in Rev. Appl. Myc. 2: 471. October 1923.)

"Strains of Hypochnus solani and Rhizoctonia solani were compared on potato plants grown in sterile soil in flower pots or plants in the field, and in pure cultures. The measurements and temperature relations were practically the same. Spores from both sources caused typical Rhizoctonia lesions on underground portions and at the surface of the ground on stems. Discrepancies occurring in some of the strains indicated that H. solani includes a variety of biological forms, ex., two strains grew less rapidly, gave sparse mycelia, and varied in virulence; minor discrepancies probably due to environment and do not invalidate conclusions." (Note by R. E. Vaughan from Rev. Appl. Myc. Abst.)

Fusarium wilt caused by Fusarium oxysporum Schlect.

The Fusarium wilt disease of potatoes was widely prevalent in 1923 but caused minor losses with one exception, New Mexico, where a loss of 10% was reported. No reports were received from the New England States. New York and the north central potato producing states reported less wilt than usual, Maryland the same, and New Jersey and Pennsylvania more than usual.

Table 22. Dates of earliest appearance of Fusarium wilt in 1923.

Date	Place	Date	Place
May 5	Yavapai Co., Ariz.	July 13	Freehold, N. J.
May 18	Marion Co., Miss.	July 26	Pierce Co., Wis.
June 6	Tuscarawas Co., Ohio	Aug.	Cloudcroft, N. M.
June 23	Suffolk Co., N. Y.		

Collaborators in New York, New Jersey, Ohio, and Indiana attribute the reduced amount of wilt to the relatively dry weather which prevailed during the growing season. The Minnesota collaborators state that wilt was aggravated by excessive moisture. This question of weather relations is discussed by Goss. (1)

The control of wilt has been largely brought about in Kentucky by roguing the fields, in North Dakota by crop rotation, stem-ending and corrosive sublimate seed treatment.

Literature Cited

1. Goss, R. W. Relation of environment and other factors to potato wilt caused by Fusarium oxysporum. Nebraska Agr. Exp. Sta. Res. Bul. 23: 1-84. 1923. (Abstracts in Rev. Appl. Myc. 2: 521. Nov. 1923; Exp. Sta. Rec. 49. Aug. 1923)

F. oxysporum is a soil saprophyte capable of infecting potato under conditions favorable for that fungus, i. e., temperature above 18°C and medium to high soil moisture. The development of the disease after infection is accelerated by conditions unfavorable for the host. The potato is most sus-

ceptible during its early growth. Plants may be infected without showing any symptoms of the disease. In conditions of high temperature and low soil moisture the vascular system may be discolored in the absence of any organism. A constant low soil moisture is unfavorable for infection, but after plants have become infected a lowering of the soil moisture accelerates the wilt.

Infection usually takes place through the roots rather than through the seed pieces. Vascular discolorations of tuber or stem are not good diagnostic symptoms unless found in connection with a wilted plant.

Fusarium tuber rots caused by various species of Fusarium

The Fusarium rots of potato tubers occur generally over the country. These seem to be usually saprophytic following injury of some kind. The most frequent predisposing injury is bruising at the time of digging or handling. With reasonably dry storage or shipping conditions such tubers develop the dry type of Fusarium rot. The wet type of Fusarium rot seems to be more usual after freezing injury or sunscald, or in old potatoes shipped in the warm spring months. The dry type of rot was reported more extensively from Colorado, Idaho, and Minnesota, and the wet type from Florida, Alabama, Louisiana, Virginia, and Kentucky. The jelly-end type of rot was reported about as usual in Idaho, and more severe than usual in California.

The control of Fusarium rots presents a difficult problem because of the wholesale handling of the crop by machinery whereby bruising is so common and almost unavoidable. Potatoes which are mature bruise less easily than those which are dug green.

Stuart, in his book "The Potato" refers to Fusarium rots as follows: (1)

> "Species of Fusarium. -- Carpenter claims that *F. eumartii*, *F. radicicola*, *F. oxysporum*, *F. hyperoxysporum*, and *F. discolor* var. *sulfureum* have been clearly proven to be parasitic upon the potato tuber. In addition to these, it is known that *F. trichotheciodes* is responsible for heavy tuber losses, due to the 'powdery dry rot,' in western Nebraska and other western states where the conditions are favorable for its development. According to Carpenter, *F. eumartii* is a new stem-end and wound-invading dry rot of the potato tuber which annually causes serious damage in Pennsylvania. *F. radicicola* is a widely prevalent dry rot similar to *F. eumartii*. It is also responsible for the so-called 'jelly-end' rot of the tuber so common in the tule lands of San Joaquin and Sacramento River delta regions in California, as well as other irrigated sections in the Pacific northwest. It is commonly associated with *F. oxysporum* in this disease. *F. oxysporum* and *F. hyperoxysporum*, which have been commonly regarded as purely vascular tissue parasites, have been found by Carpenter to be capable of entirely destroying potato tubers. *F. discolor*, var. *sulfureum* occurs in hollow hearted potatoes, causing decay. The infected portion of the tuber turns a sulfur yellow. According to Carpenter, it has been isolated from decaying tubers from both North and South Dakota."

Recent literature

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Mosaic, cause unknown

The mosaic disease continues to be a serious trouble of potatoes.

The distribution of and losses due to mosaic are indicated in the following table.

Table 23. Potato mosaic losses in 1922 and 1923.

State	Percentage loss		State	Percentage loss	
	1922	1923		1922	1923
N. H.	5	same	Ark.	10	10
Vt.	10	less	Ind.	.5	.5
Mass.	10	same	Wis.	trace	trace
Conn.	.5	less	Ill.	trace	trace
N. Y.	5	5	Minn.	1	1
Pa.	3.5	1.5	Mich.	3	2
N. J.	.5	less	Iowa	-	5
Del.		.25	Mo.	5	5
Md.	2	5	N. D.	trace	trace
Va.	1		Kans.	.5	trace
Ky.	4 spr.	10	Neb.	-	1
	15 fall	10	Utah	7	10
Tenn.	3	-	Ariz.	trace	trace
S. C.	trace	trace	Idaho	10	10
Miss.	10	-	Nev.	-	8
La.	25	15	Calif.	-	12
Tex.	trace	-			

The reduction in visible mosaic in 1923 is attributed to the high temperature during midsummer which masked the mosaic symptoms. Goss, of Nebraska, reports that mosaic was brought out early in the season by increased rainfall, low temperature and less sunlight. On the first field inspection mosaic was noted in 344 out of 346 fields, the percentage of diseased plants being 4.6%.

Folsom of Maine reports; "In the northeastern part of the state, about 30% of the hills had a degeneration disease, usually mosaic or spindle tuber."

Following the work of Schultz and others in determining that aphids are largely responsible for the spread of mosaic, Gilbert of Vermont reports a lack of these insects, and less mosaic in 1923. Rosa, of California, says:

> "The mosaic disease is rapidly becoming more serious due to the general presence of aphids in the spring of the year and to the failure of seed growers to perform their roguing early in the season. The latter operation has too generally been deferred until the crop was practically mature."

The Bliss Triumph variety continues to be most frequently mentioned as susceptible with Green Mountain a close second. The White Rose of California is also said to be highly susceptible. Hungerford, of Idaho, says the Netted Gem is more resistant than the Idaho Rural. According to Rosa the British Queen is highly resistant in California. Martin, of New Jersey, says mosaic is severe on American Giant and Green Mountain but not severe on Irish Cobbler. Temple and Jehle of Maryland report that the McCormick is their most susceptible variety.

The control of mosaic is being brought about by using certified disease free seed. This is especially important in the southern states where they can not grow their own seed.

Recent literature

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Doolittle, S. P. and H. H. McKinney. Intracellular bodies in the phloem tissue of certain plants and their bearing on the mosaic problem. Phytopath. 13: 326-329. pl. XV. July 1923. No. 7. Conclusion: the same as that of Kotila and Coons.

Hungerford, Chas. W., and J. M. Raeder. Mosaio and leaf roll of potatoes in Idaho. (Abstract) Phytopath. 14: 123. Feb. 1924.

Kotila, J. E. Mosaic and potato yields in Michigan. Quart. Bul. Agr. Exp. Sta. Mich. 5: 188-189. illus. May 1923. No. 4.

___________ & G. H. Coons. Trypanosome-like bodies in Solanaceous plants. Phytopath. 13: 324-325. July 1923. Conclusion: "The correlation of the trypanosome-like bodies with mosaic has not been proved and further investigations are necessary."

Leafroll, cause unknown

The leafroll disease in 1923 was reported as less prevalent than in 1922 in Vermont and Pennsylvania, about the same in New Hampshire, Connecticut, Minnesota, North Dakota, Utah and Idaho, and more in Massachusetts, New York, New Jersey, and Delaware. M. W. Gardner of Indiana says leafroll is the most serious potato disease in Indiana. Folsom of Maine, reports net necrosis giving leafroll in potato tests in the central part of the state.

The losses attributed to leafroll are New York, 7%; New Jersey, 6%; Pennsylvania 10%; Delaware, 2.5%; Indiana, 5%; Michigan, 5%; New Mexico, 2%; and Idaho, 3%. Owing to the difficulty of estimating losses from this type of disease, it is probable that the reduction in yield is more widespread than collaborators' reports would indicate. Chupp, of New York, reports the occurrence of leafroll in 87% of the 365 fields entered for potato certification this year.

The only dates of first appearance reported are June 11, Queens County, New York; July 7, Highwood, Connecticut; and August 1, Coconino County, Arizona.

There is no definite data regarding the influence of weather conditions. However, Chupp, of New York, thinks there is some connection because certain strains that were almost free in 1922 showed heavy increases in 1923.

The Irish Cobbler and American Giant are said to be especially susceptible in New Jersey, the late crop of Rurals in Indiana, the Russett Burbank in Utah, and the Netted Gem in Idaho.

The control of leafroll can best be brought about by using a seed plot and roguing the fields early and thoroughly. This is the opinion of collaborators in New York, New Jersey, Pennsylvania, Delaware, Ohio, and Michigan.

Recent literature:

Hungerford, Chas. W. and J. M. Raeder. Mosaic and leaf roll of potatoes in Idaho. (Abstract) Phytopath. 14: 123. Feb. 1924.

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Potato tipburn, cause non-parasitic, and hopperburn induced by leaf hopper (*Empoasca mali* LeB.)

Hopperburn and tipburn are not distinguished in the collaborators' reports. In the seventeen states where there are comparative data available it is seen that, with the exception of New York, Maryland, Kentucky, and Alabama, this disease was much less prevalent in 1923 than in the previous season of 1922. This point is brought out in the accompanying graphic representation fig. Estimates of losses were received from the states of Massachusetts, Connecticut, New Jersey, Missouri, and Mississippi in 1922 but no estimates were received in 1923, so it is assumed that the disease was of very minor importance. Tipburn is conspicuous by its absence in reports from the Rocky Mountain and Pacific Coast sections.

The appearance of tipburn occurred noticeably later in the season in 1923 than in 1922, as indicated in the following table.

Table 24. Dates of earliest appearance of tipburn in 1922 and 1923.

Date of appearance		State	Date of appearance		State
1922	1923		1922	1923	
April		La.	June	July 30	S. D.
May 10		Miss.	July 1	June 25	N. J.
May		Okla.		July 18	Ill.
June 3	July 3	Minn.	Aug. 2	July 27	Ohio
	June 5	N. C.	July 10		Vt.
	June 9	N. Y.	July 29		Conn.
June 16		Del.		July 30	W. Va.
June 28	July 25	Wis.			

The cold backward weather in April, May and early June is considered by Kotila (Michigan) to be the explanation of the late arrival of leafhopper

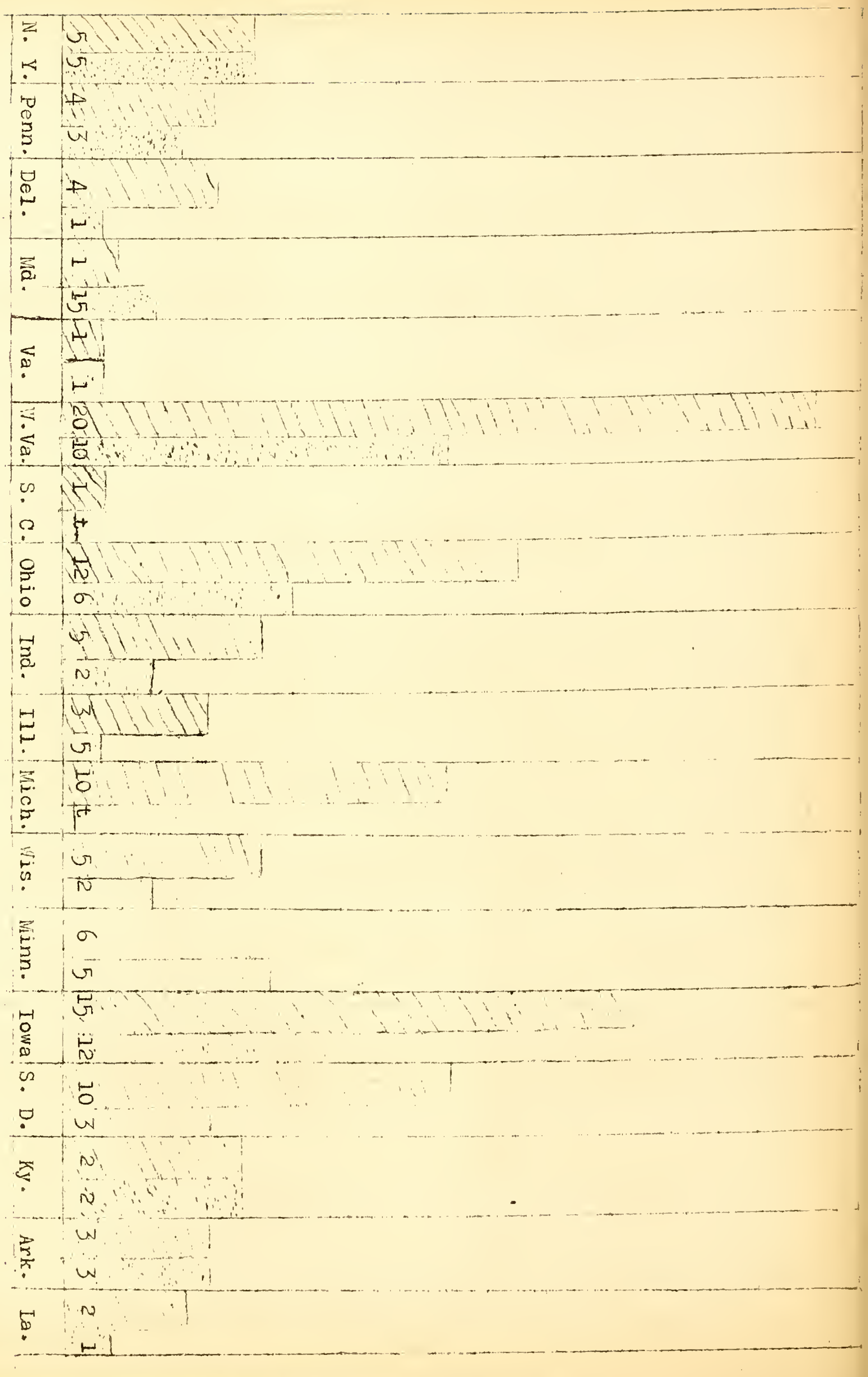

Fig. 5. Relative Percentage Loss from Potato Tipburn and Hopperburn 1922-1923.

▨ =1922 ▢ =1923

in potato fields. This judgment is concurred in by members of the Bureau of Entomology, United States Department of Agriculture.

The control of hopperburn by the use of Bordeaux mixture was not as striking in 1923 as in seasons when the hoppers have been more prevalent. However, thorough spraying with properly made Bordeaux mixture continues to be the best control measure for the trouble.

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Lutman, B. F. An outbreak of hopperburn in Vermont. Phytopath. 13: 237-241. 1923.

Parks, T. H. and E. E. Clayton. Potato hopperburn (tipburn) control with Bordeaux mixture. Ohio Agr. Exp. Sta. Bul. 368: 243-258. June 1923.

Triumph most susceptible, Irish Cobbler least susceptible of early varieties. None of the late varieties were found to be immune to hopper burn. Members of the Green Mountain group seemed to resist the leafhopper better than members of the Rural group. The Bordeaux formula recommended for Ohio conditions was 5 pounds copper sulfate and 7 1/2 pounds lime to 50 gals. water. The average increase from 60 field tests was 31.6 bushels per acre. Spray was applied 4 or 5 times. Potato News Bul. 1: 63. No. 4. Feb. 1924.

Perret, Claude. La dégénérescence des pommes de terre. Le role de l'inspection aux champs. Vie Agr. et Rur. 23: 61-66. July 28, 1923. (Abst. in Rev. Appl. Myc. 2: 568. Dec. 1923). The author uses the iodine water test to distinguish leafroll from similar symptoms induced by Rhizoctonia, blackleg, basal injuries, premature drying and other causes. The operation of this test is as follows: "The leaves of suspected plants should be gathered in the early morning, boiled in Eau de Javelle, rinsed in ordinary water, dipped into water containing a few drops of iodine and rinsed again. The leaves of diseased plants show a dark brown discoloration owing to the accumulation of starch. Leaves detached in the evening and placed overnight with the petioles in water retain their starch if diseased and lose it if healthy."

Other degeneration diseases

Curly dwarf, cause unknown, is considered by many to be a stage or symptom of mosaic. The plants are dwarfed in appearance and the yield is said to parallel infected plants. Weber reports a 2 per cent loss in Florida. Thomas, of Ohio says curly dwarf is not important where certified seed is used.

Spindle sprout, cause unknown, is a disease of minor importance. It was reported from Kentucky, North Dakota, South Dakota, Nevada, Idaho, and California. A disease of apparently similar nature but of slightly different type was reported from Idaho.

Spindle tuber, a disease the cause of which is unknown, is considered by Schultz and Folsom (1) to be the result of infectious disease. It has been transmitted from affected to healthy plants by means of tuber and haulm grafts, leaf mutilation inoculation, and plant lice. In the above respects it resembles the mosaic disease. Plants infected late in the season may not show any symptoms, while those infected early have more cylindrical, spindling and spindle shaped tubers than healthy plants. The eyes of the tubers are numerous and more conspicuous than usual. The yield is somewhat reduced in the first year and there is a progressive decreased production in later years from plants grown from spindle tubers. The control of the disease seems to lie in field and hill selection and the use of certified seed.

Spindle tuber was reported in 1923 from Maine, Vermont, New York, New Jersey, Ohio, Kentucky, South Dakota, and Nebraska. Chupp, of New York, states that, "spindle tuber or marginal leaf roll has been found quite prevalent in many potato sections. No doubt it has often been mistaken for leaf roll or even mosaic in previous years." Martin, of New Jersey, and Evans of South Dakota say it is common in the Irish Cobbler variety.

Degeneration diseases not distinguished as to type were considered by Gardner of Kentucky and Miss Detmers of Ohio to be about the same as in 1922. They occur generally wherever potatoes are grown and in some cases every plant in a field will show breaking down with consequent loss of crop. Roguing out diseased plants in the field and selection of seed are given as the only control measures suitable to the type of troubles in which are evidently phases of leafroll or mosaic. Folsom of Maine reports: "Reduction in gross yield from degeneration diseases probably was 30%."

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Schultz, E. S. and Donald Folsom. Transmission, variation, and control of certain degeneration diseases of Irish potatoes. Jour. Agr. Res. 25: 43-117. July 14, 1923.

Wart caused by Synchitrium endobioticum (Schilb.) Perc.

Potato wart was not discovered in any new location during 1923. Investigational work was continued by the United States Bureau of Plant Industry, cooperating with the State College of Agriculture and State Department of Agriculture of Pennsylvania. Quarantine regulations were kept in force as regards intrastate, interstate and international commerce.

Dr. Freeman Weiss has submitted the following statement for inclusion in this summary:

> "No further survey for wart was made, except in the agricultural section, largely devoted to potato culture, which surrounds the area under quarantine at Freeland, Pa. No infection was found there, but only about one third of the potatoes planted were of susceptible varieties. Within the quarantined area all wart-susceptible varieties were rogued out early in the season, so that during the period of maximum infection nothing but immune potatoes were to be found in the entire area, with the exception only of the experimental gardens of the State and Federal Authorities. In these wart appeared earlier in the season than ever before noted -- June 23 on potatoes planted May 12 -- and its development was favored by the cool season. In July and August there were drought periods of 2 to 3 weeks duration. The mean growing-season temperature was 2.2° below the 10 year normal. Infection on tomatoes was more general than in previous years since 1920.
>
> "The variety Russet Burbank has been added to the list of those immune to wart -- a fortunate circumstance, since this variety combines high resistance to scab and immunity to wart."

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_____________ ____________ and R. E. Hartman. Investigations of potato wart. U. S. Dept. Agr. Bul. 1156. 21 p. May 1923.

Miscellaneous parasitic potato diseases

Bacterial soft rot, otherwise known as slimy soft rot, was a serious trouble in early potatoes shipped from the southern states. Miles, of Alabama, estimates a 10 per cent loss in every car shipped to northern markets. It was frequently associated with the wet type of Fusarium rot.

Potato brown rot due to Bacterium solanacearum EFS. was reported as serious in half the fields of Florida. Weber states that "a twenty acre field near Federal Point showed 40% infection, with a 10% reduction in yield. Another 60 acre field near Hastings showed 12-15% reduction in yield. The total loss to Florida would probably be 3-5%." It was also reported as present in the southeastern part of Maryland.

Silver scurf caused by Spondylocladium atrovirens Harz. was reported as a very minor trouble in Maine, Connecticut, New York, Florida, Idaho and Washington.

Wilt caused by Verticillium alboatrum Reinke and Berth. was reported for the first time in Connecticut where at least 10% of the vines were killed prematurely in several fields. It occurred chiefly on Spaulding Rose in the vicinity of Middletown. It was also reported in New York and Maine. Chupp, of New York, states that only isolation of the fungus can differentiate between Fusarium and Verticillium wilts.

Southern blight caused by Sclerotium rolfsii Sacc. was evidently common in Florida, Alabama, Louisiana, and Texas. It caused losses varying from a trace to 30 per cent in the field and was also found during transportation.

Yellow dwarf, cause undetermined, was evidently less important than the previous season. Martin reports one plant found in a 20 acre field in Monmouth County, New Jersey. Weber reports a few affected plants found near Hastings, Florida. This is the first report of its occurrence in Florida. The source of the seed was doubtful. Chupp says that this is the most menacing disease of potatoes in New York, where it is found mostly in the Mohawk Valley. The loss to the crop is estimated at .5 to 1%. In 1922 it was reported from Vermont, New Jersey, Pennsylvania, and New York.

Root-knot caused by nematode, Heterodera radicicola (Greef) Müll. was reported in one case in Alabama where 10% of the tubers were affected. The vines were also dwarfed. It was noted as prevalent in Texas causing a 1% reduction in yield. Stokdyk and White report the first finding of root knot on potato in Kansas. It was found attacking an old seed piece at Kansas City August 9, 1923. The root-knot was also found on roots and young stalks in the greenhouse at Manhattan. The greatest damage in the country is reported from California where Milbrath says the root-knot is general causing a loss of 8%.

Other parasitic troubles reported were leak caused by Pythium debaryanum Hesse, Connecticut (in storage), Mississippi (spring crop), Idaho and Washington (mid-season crop), and California (delta region); powdery scab caused by Spongospora subterranea (Wallr.) Johnson, Connecticut; purple tuber rot caused by Rhizoctonia crocorum DC., New York (Cortland County, first specimens ever received at the laboratory - Chupp); yellow wilt caused by Sclerotinia libertiana Fckl., New York and Florida; Armillaria root rot caused by Armillaria mellea (Fr.) Quelet, Michigan; anthracnose caused by Colletotrichum atramentarium (Berk. & Br.) Taub., Florida, Ohio.

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Inoculation experiments established the separate identity of skin spot and powdery scab.

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Skin spot is a primary stage in the development of powdery scab and not a separate disease due to Oospora pustulans, Colletotrichum atramentarium, or a Phoma sp. These fungi are undoubtedly secondary invaders.

Miscellaneous non-parasitic diseases

Blackheart was reported in Connecticut, New York, Michigan, Wisconsin, Washington, and California. In no case was it a major trouble but was found largely in seed stock that was shipped in overheated cars or stored in too deep and air tight pits or bins where a lack of oxygen developed.

Stem-end browning was reported by Folsom, of Maine, as generally attributed to climatic conditions, as it could not be correlated with organisms or leaf roll.

Fertilizer injury. Martin, of New Jersey, reports that in plots where all the nitrogen was derived from inorganic material the plants were green on

July 27, while those that received half the nitrogen from organic sources were dead. In a triangle experiment the plots receiving increased amounts of nitrogen were green on the above date, while those receiving larger amounts of potash and phosphoric acid were dead.

Missing hills, brought about by a variety of causes such as poor planters, poor seed, poor climate, poor farmers, and poorly tilled soil, are said by Chupp of New York to reduce the yield in that state by about 5%.

Frost injury. Frost did little damage to the potato crop in 1923. The early crop from Florida was delayed about 3 weeks by a severe frost of February 19. Some of the plants failed to sprout a second time. The Georgia crop was checked by a frost March 19. In Minnesota a frost August 1 injured the late crop 1% in the northern counties. The heavy frost of September 13 did considerable damage in Wisconsin and Michigan. This was especially true where the crop was late in development because of its being checked by the summer heat and drought.

Dry weather which caused premature dying cut down the yield of early potatoes in New Hampshire and Connecticut and probably also in other eastern and central states. Less drought trouble than usual was reported from Idaho. McCubbin, of Pennsylvania, makes the following observation:

> "Seed potatoes which sprout blindly into small tubers, or in which the eyes develop small clusters of tubers instead of normal sprouts have been observed. It is suggested that this may be due to the devitalizing effect of the hot weather of 1922."

Excessive moisture was held responsible for some cases of poor germination to potatoes on low ground in Florida. (A. C. Foster)

Other non-parasitic troubles reported were hollow heart, Connecticut, Wisconsin, Washington; internal brown spot, Washington; brown streak, California (seems to be associated with an unusually dry season and improper cultural conditions; loss 5% - Milbrath); surface breakdown, Michigan (very common in storage; probably due to lack of oxygen - Kotila); spray injury, Mississippi; lightning injury, New York, Michigan, Wisconsin; enlarged lenticels, and chlorosis, Washington.

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DISEASES OF TOMATO

Leaf spot caused by Septoria lycopersici Speg.

Leaf spot caused by Septoria lycopersici Speg. is one of the major diseases of tomato in the Middle Atlantic and North Central states. It has not been reported from the Pacific Coast. During 1923 leaf spot was reported less severe than usual in Connecticut, New York, New Jersey, Maryland, Florida and

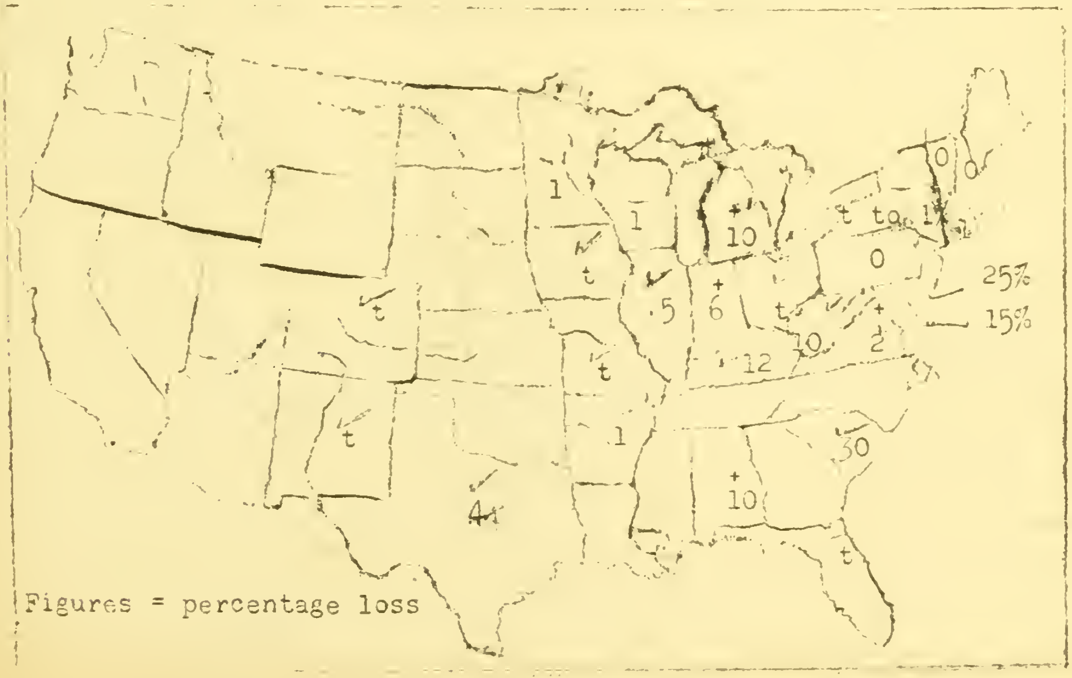

Fig. 6. Relative prevalence and losses from Septoria leaf spot, 1923

Wisconsin. Practically the same losses as usual occurred in West Virginia, Kentucky, South Carolina, Arkansas,. Illinois. North Dakota, Minnesota, Iowa, Missouri, Kansas, Colorado, and New Mexico. It was more severe than usual in Delaware, Virginia, Ohio, Indiana, and Michigan.

The spread of leaf spot seemed to be held in check in many places by the drought of midsummer and only came on in epidemic form following the late summer and early fall rains. The greatest amount of leaf spot occurred when the crop was in full development or near maturity. The disease causes a dropping of leaves and consequent dwarfing and possible scalding of fruit.

Recent literature

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Hall, H. F. More tomatoes from the same acreage. Canner 56 (10): 122-123. Mar. 3, 1923.

Bordeaux fish-oil soap 4-4-1 1/2-50 has given best control of leaf spot on farms of Joseph Campbell Co., Camden, N. J.

Wilt caused by Fusarium lycopersici Sacc.

This disease caused widespread losses in 1923. Collaborators report wilt as more severe than usual in New Jersey, Delaware, Virginia, Illinois, Michigan, Iowa, Utah, and New Mexico. It was about the same as usual in Maryland, South Carolina, Mississippi, Louisiana, Texas, Arkansas, Missouri, Kansas and Ohio, and less than usual in Kentucky, Indiana, Wisconsin, North

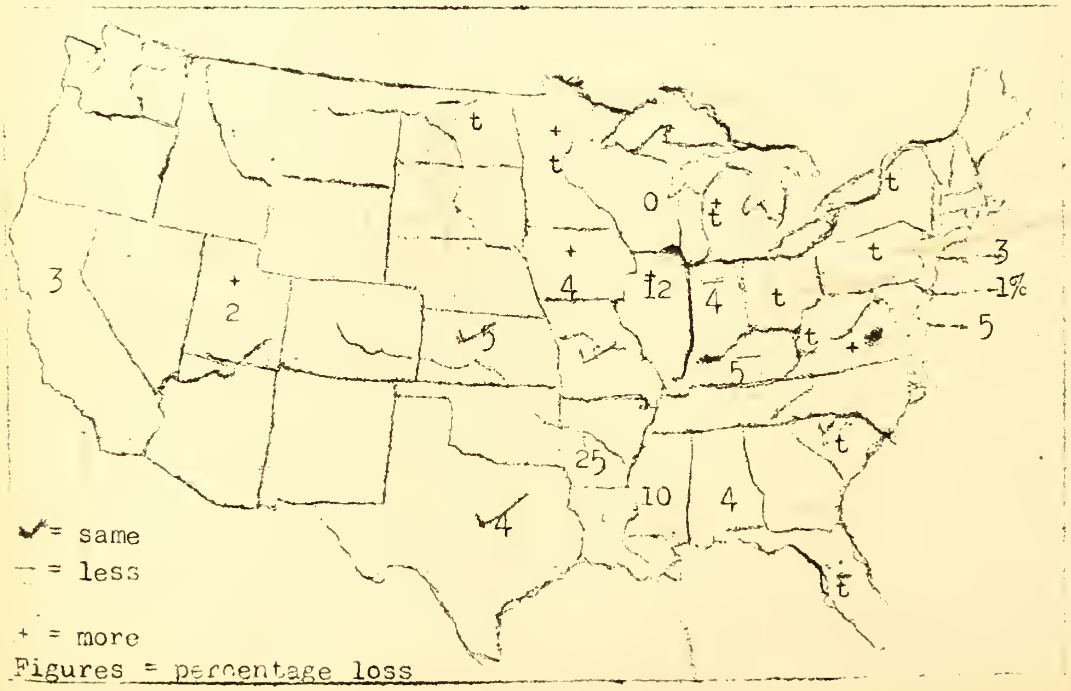

Fig. 7. Relative prevalence of and losses from Fusarium wilt in 1923

Dakota, and California. This disease is not so widespread as the leaf spot.

Wilt in Utah assumed serious proportions this year and Richards states that the future of the canning industry is endangered unless resistant varieties can be found. The estimated losses are entered on the accompanying map. Coons reports from Michigan that wilt was widely distributed around Grand Rapids by using plants started in infected soil in greenhouses or by bringing in infected plants from Indiana or the South. Indiana is said to have imported 18,000,000 plants from the South.

What was said to be the first authentic record of the occurrence of wilt in Minnesota was received in 1923. It caused moderate losses in a few fields of Hennepin County.

The hot, dry weather is considered by Martin, of New Jersey, to be the leading factor in causing the serious outbreak of wilt.

Table 25. Dates of first appearance of Fusarium wilt in 1923.

Date	Place	Date	Place
May	Davis, Calif.	June 16	Chanute, Kans.
May	Baton Rouge, La.	June 25	Peoria, Ill.
May 4	Tiffin, Ohio	July 15	Newark, Del.
May 24	Copiah Co., Miss.	Aug. 12	Layton, Utah
June 1	Yavapai Co., Ariz.	Aug. 23	Long Island, N. Y.
June 11	Hardville, S. C.		

Disease resistant varieties are coming into more general use in Louisiana and, according to Edgerton, are responsible for preventing greater losses from this cause. Gardner, of Kentucky, reports -- the Marvel 90% resistant, and the Norton 80% resistant under their conditions. Resistant varieties are also reported as satisfactory in Mississippi, Arkansas, and Kansas. Martin, of New Jersey, reports the Greater Baltimore variety as very susceptible. There seems to be no other method of control which gives any promise of success.

Recent literature

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Pritchard, F. J. Tomato diseases and how to overcome them. The Canner 56. No. 10: 124-125. Mar. 3, 1923.

Shapovalov, M. and J. W. Lesley. The behavior of certain varieties of tomato to the wilt disease (Fusarium) in California (Abstract) Phytopath. 14: 121. Feb. 1924.

White, R. P. Tomato wilt. (Abstract) Phytopath. 14: 28. Jan. 1924.

Early blight caused by Alternaria solani (E. & M.) J. & G.

This disease is largely a southern disease and does relatively little damage in the Atlantic or central sections. One county in Florida is reported by Weber to have lost $100,000 from this cause. It was more serious than usual in Florida, Alabama, Mississippi, Louisiana, Indiana, Illinois, and Iowa. In New York, New Jersey and Maryland the infection occurred largely on the leaves, in Florida and Mississippi the fruit spot and rot was most serious, while in Indiana the collar rot which came from seed bed infection caused the greatest damage. In sections where early blight occurs it is reported as general rather than confined to scattered areas.

Table 26. Dates of first appearance of tomato early blight, 1923.

Date	Place	Date	Place
Jan. 1	Key West, Fla.	June 29	Baton Rouge, La.
Apr. 4	Copiah, Miss.	July 31	Seaford, Del.
June 3	Cortland, N. Y.	July 25	Illinois
June 7	Burlington Co., N. J.	Aug. 3	Storrs, Conn.
June 25	Grant Co., Ind.	Aug. 15	Fargo, N. D.

The prevalence of tomato early blight seems to be closely associated with the rainfall during the growing season. The rains came so late in New York and New Jersey that little damage was caused.

There have been no reports regarding disease resistance or susceptibility with reference to early blight. The only control measure that has given satisfaction is the use of properly made and applied Bordeaux mixture. Spraying has not been generally practiced, which may account for the extensive losses.

Recent literature

Pritchard, F. J. Tomato diseases and how to overcome them. The Canner 56 (10): 124-125. Mar. 3, 1923.

Leaf mold caused by Cladosporium fulvum Cke.

Leaf mold was widespread as a greenhouse disease in 1923. It was reported in the fields in the canning sections of Kentucky as causing an unusually heavy damage which was followed by the leaf spot disease. The rainfall during July and August was more than usual. White, of Kansas, reports seeing the disease in the fields for the first time. Cook and Toro reported leaf mold as severe in Porto Rico.

The control of leaf mold is usually brought about by reducing the humidity by attention to ventilation. Chupp, of New York, reports one man who used an electric fan to force ventilation. Gardner, of Indiana, says one man sprayed his greenhouse in the fall with lime sulphur with fair success.

Blossom end rot, non-parasitic

Blossom end rot is one of the widespread diseases of tomato. It is reported from the Atlantic to the Pacific coast. Reports from collaborators in 1923 show it was more than usually prevalent in Connecticut, New Jersey, Delaware, and Mississippi; about the same as usual in Ohio, Illinois, North Dakota, Washington, and California; and less than usual in Louisiana, Minnesota, Wisconsin, Iowa, and Idaho. Poole, of New Jersey, says blossom end rot was worse in 1923 than for the past four years, occurring in both greenhouses and fields.

Table 27. Blossom end rot losses and dates of first appearance.

State	Percent loss	Date of first appearance	State	Percent loss	Date of first appearance
Vt.	t	October 8	Ohio	same	
Conn.	more	August 12	Ind.	t	
N. J.	3		Ill.	1	June 29
Pa.	1		Mich.	t	
Del.	more	July 25	Wis.	t	
W. Va.	2		Iowa	t	
N. C.	15		Mo.	5	
Ala.	5		N. D.	t	July 30
Miss.	10	May 25	Kans.	2	
La.	t	June	Ariz.	minor	July 1
Tex.	1		Idaho	less	
Ark.	1		Wash.	same	
			Calif.	same	

There is considerable difference in varieties as to susceptibility to blossom end rot. Gilbert, of Vermont, says Bonney Best is very susceptible. Nixon, of Pennsylvania, says there are strains of Stone that are very susceptible, while Brown of Arizona says that Stone and Earliana showed no disease while other unnamed varieties showed the disease. Milbrath, of California, says blossom end rot is very severe on the Earliana variety. He also says there is more trouble with the early set fruit than with the late crop. Adams, of Delaware, and White, of Kansas, also report a greater amount of end rot on early set fruit.

The conditions under which the plants are grown seem to determine the amount of blossom end rot. White, of Kansas, says the soil and air temperatures are as important as the soil moisture. Chupp, of New York, reports as follows:

> "Dr. L. M. Massey found that in one greenhouse at Irondequoit, Monroe County, 25% of the fruit on 50% of the 1000 plants were badly affected with blossom end rot. The grower had luttuce planted with the tomatoes so kept the soil as dry as possible. After the lettuce was harvested, he began watering heavily with the result that within a week the disease began to appear. The fruit was about one-half mature."

Bacterial wilt caused by *Bacterium solanacearum* EFS.

This disease was reported in 1923 from seven states and Porto Rico. It was especially serious in Florida, Mississippi, and Louisiana. Edgerton says that it has caused the most damage (5%) for many years in Louisiana. He attributes the greater amount of bacterial wilt to the very wet weather. There are no observations on disease resistance or any methods of control.

Mosaic, cause unknown

Mosaic, cause unknown, is usually considered a minor disease although in some cases it may assume serious proportions. Young and Thomas of Ohio say that mosaic is second in importance only to wilt and is causing much loss in both field and greenhouse cultures. Mosaic was reported by collaborators as more prevalent than usual in Delaware, Maryland, Ohio, Iowa, Nebraska, Kansas, Utah and Idaho. It usually occurs scattered in a field. Adams, of Delaware, says:

> "This disease was the most limiting factor in seed bed production. Closely related wild plants are carriers. Methods of cultivation have indicated a relation to rapid distribution in the field."

Gardner, of Indiana, thinks tomato mosaic is retarded by low temperature. Martin, of New Jersey, found more mosaic on light soil and high ground than on heavier soil.

Mosaic has been reported on the following varieties: Teuton, Bonney Best - very bad; Acme, Earliana and Greater Baltimore - medium. White, of Kansas, observed no varietal resistance.

Literature

Gardner, M. W. & Kendrick, J. B. Field control of tomato mosaic. Phytopath. 13: 372-375. Aug. 1923.

Kofoid, C. A., H. H. P. Severin, and O. Swezy. Nelson's spiral bodies in tomato mosaic not protozoans. Phytopath. 12: 330-331. July 1923.

Root knot caused by nematode, *Heterodera radicicola* (Greef) Müll.

In the canning sections this trouble is not reported in fields. Reports of nematode trouble in greenhouses from New Jersey, New York, and Ohio. Field losses from nematode occur in South Carolina, 10%, California, 10%, Alabama, 2%, New Mexico, 2%, Texas, 1%, and Arizona. In the South it may be associated with the wilt disease. Moore, of South Carolina, says it is becoming more serious throughout the state. Steam sterilization of greenhouse soil is the most satisfactory method of control, where it can be employed.

Malloch (1) gives a list of 98 varieties and 8 controlled hybrids of tomato that have been found by him to be susceptible to root knot. He believes that there are no physiological or biological races of the nematode, one form attacking all hosts.

Literature cited

1. Malloch, W. S. The problem of breeding nematode-resistant plants. Phytopath. 13: 436-450. Oct. 1923.

Other diseases

Late blight caused by Phytophthora infestans (Mont.) DeBary. There was an unusually small amount of this disease in 1923. A few specimens were reported from New York, West Virginia, and California. Negative reports were received from Virginia and Ohio.

Buckeye rot caused by Phytophthora terrestris Sherb. was reported by Berg of West Virginia. Although this is the first report from that state, Berg states it was first noted in their pathological garden in 1917. The fungus closely resembles the lemon fungus Phythiacystis. Kendrick, of Indiana, reports buckeye rot in a few greenhouses. Weber, of Florida, says buckeye rot is considered one of the destructive tomato diseases, ranking next to early blight in importance. A 5% loss resulted from this disease. A 90 acre field near Homestead showed 50-70% loss.

A new Phytophthora isolated in 1917 from tomato fruit shipped from Mexico to Seattle, Washington, has been described by Hotson and Hartge (4) as P. mexicana. The organism causes a black wilt when inoculated into plants, and a destructive rot of fruits infected.

Phoma fruit rot caused by Phoma destructiva Plowr. (2) was of minor importance in 1923 except in Iowa where Melhus reports it doing considerable damage, and in Ohio where Young says itswas very destructive, especially in the southern and central part of the state. It was also reported in the fields from New York, Florida, and Alabama. Heald and Dana, of Washington, found it on fruit sent in from Mexico and Mississippi.

Anthracnose caused by Colletotrichum phomoides (Sacc.) Chester was of minor importance in 1923 with the exception of New Jersey, where Poole says: "The disease was reported August 23 on Bonny Best. It was very destructive during September causing heavy loss in many fields." It was reported also from Indiana, Washington (on fruit sent in from Mississippi), and Florida (loss negligible).

Bacterial spot caused by Bacterium vesicatorium Doidge (3). This disease was reported by Gardner, of Indiana, as causing more loss than usual. although still of minor importance. He attributes the increase to the use of untreated seed and southern grown plants. It was also reported from Kansas and Missouri. An undetermined bacterial spot was reported by Clayton, of New York. (Long Island).

Soft rot caused by Oidium lactis Fresen. or Oospora lactis (Fresen.) Sacc. was reported from New Jersey as serious following growth cracks. It was worse during damp, rainy weather. Pritchard and Porte (6) have described a watery rot of tomato fruits due to a physiological form of Oospora lactis, indistinguishable morphologically from the parent species, to which they apply the trinomial O. lactis parasitica. It has been common since the spring of 1921 in tomatoes shipped from the Gulf States, and is prevalent in the vicinity of Arlington, Virginia, and the District of Columbia.

Olpidium brassicae (Wor.) Dangeard was found in the roots of tomato plants in a greenhouse at the University of Wisconsin (1). It has not been reported previously in this country.

Western yellow blight, cause uncertain. This has variously been ascribed to bacteria, Fusarium, Rhizoctonia, and by Heald, of Washington, to a virus. It seems to be the result of unfavorable environment with the organism, if any, a secondary matter. Shapovalov states that distribution and prevalence depend on climatic conditions; and thinks that "it is probable physiological collapse of the small rootlets precedes the fungus infection". (7) It was much less prevalent in 1923 than in previous years. It was reported from Arizona, California, Washington, and Idaho.

Winter blight, stripe, or streak, cause undetermined (5,8) was reported as rather common in New York and New Jersey. More streak was found in greenhouses than fields and it was often associated with mosaic.

Puffing is said by Milbrath to be very abundant in California affecting 20% of the fruit. Taubenhaus reports puffing as prevalent in Texas where the Detroit variety is very susceptible.

Other diseases reported were canker caused by Phytophthora sp. (Reddick's species), New York (two fields near Ithaca); damping-off caused by Pythium sp., Florida; damping-off caused by Rhizoctonia sp., Mississippi, Illinois; southern wilt caused by Sclerotium rolfsii Sacc., Florida, Alabama, Mississippi, Louisiana, Texas; root rot caused by Ozonium omnivorum Shear, Arizona; watery soft rot caused by Sclerotinia libertiana Fckl., Florida (doing minor damage to large spreading vines with dense foliage); soft rot caused by Bacillus carotovorus Jones, New Jersey (serious following hail injury); soft rot caused by Rhizopus spp., New Jersey, Florida, California; soil rot caused by Rhizoctonia sp., Indiana; leafspot caused by Gloeosporium phyllachoroides Ell. & Ev., Florida; leafroll, cause uncertain, New York; collar blight, cause undetermined, Delaware (considerable damage locally in New Castle County); wilt caused by undetermined bacteria, Ohio (5% of plants infected in one greenhouse); hollow stem, cause unknown, Arkansas (attributed to too much nitrogen in the fertilizer); blossom drop, cause unknown, Ohio, Texas; sun scald, New York, Wisconsin, Washington; frost injury, Georgia, Florida, Texas, California; hail injury, Kansas (several fields severely injured by a hail storm August 23; some fields a total loss and many running as high as 80%).

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   "The organism which produces "stripe" disease of the tomatoes is shown to be the cause of a number of streak diseases of other plants, namely, sweet pea, culinary pea, broad bean, French bean, red clover, Lucerne, Lupin, vetch, Sainfoin, and potato."

6. Pritchard, F. J. and W. S. Porte. Watery-rot of tomato fruits. A physiological form of Oospora lactis; effect on the host; penetration of the cell walls by enzymic action. Jour. Agr. Res. 24: 895-905. June 16, 1923.

7. Shapovalov, M. Effect of environmental conditions on western yellow blight of tomatoes. (Abstract) Phytopath. 14: 120-121. Feb. 1924.

8. Taylor, W. H. Tomato diseases. Black stripe and its control. New Zeal. Jour. Agr. 26: 101-103. Feb. 20, 1923. Abs. Rev. Appl. Myc. 2: 430. Sept. 1923. The disease is promoted by excessive application of stable manure, but this can be counteracted by applications of blood-and-bone and sulphate of potash. Watering with sulphate of potash solution is sometimes sufficient.

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DISEASES OF SWEET POTATO

Stem rot and wilt caused by Fusarium batatatis Woll. and F. hyperoxysporum Woll.

This disease is widely prevalent in the sweet potato growing sections of the country. It is reported as the limiting factor in sweet potato culture in New Jersey, Delaware, Iowa, Missouri, and Kansas. It was exceptionally scarce in Florida in 1923 and of only local importance in Georgia, Alabama, and Mississippi. Plants show symptoms of the disease in both plantbed and field.

Table 28. Losses caused by wilt, 1923.

State	Loss percent	State	Loss percent
New Jersey	30	Alabama	1
Kansas	15	Mississippi	t
Delaware	8	Georgia	present
Iowa	7	Florida	very scarce
Missouri	5	Ohio	present
Maryland	4	Indiana	present
Arkansas	2	California	10% on susceptible varieties.

The dry, hot weather of June is considered by Martin, of New Jersey, to be a leading contributing factor in the prevalence of wilt.

The control of wilt has largely been effected in Mississippi, (Neal) by maintaining a state inspection of plants, strict quarantine over shipment of plants and general plant sanitation. The use of select resistant strains is also a promising way in which wilt is controlled. Martin, of New Jersey, says there are now in limited use resistant strains of Big Stem Jersey, Triumph, Dahomey, Red Brazil, and White Yam. The Triumph is also reported as resistant to wilt in Alabama and California. The Porto Rico is another resistant variety of California. The Little Stem Jersey is said to be very susceptible in Delaware.

A sweet potato variety demonstration was held by J. F. Adams in Delaware with the following results:

Table 29. Comparison of susceptibility of sweet potato varieties to wilt in Delaware.

Strain selected	Percentage of wilt	Strain selected	Percentage of wilt
Triumph	1	Little Stem	6
Big Stem	2	Early Carolina	6
Nancy Hall	3.5	Southern Queen	7
Porto Rico	5	Check (Big Stem)	35

The sprouts for the test were supplied by L. L. Harter, Bureau of Plant Industry.

Black rot caused by Sphaeronema fimbriatum (E. & H.) Saco.

Black rot did not cause extensive losses in 1923 with the exception of Texas, where a loss of 10% was reported. It was generally distributed throughout the sweet potato growing regions.

Table 30. Black rot losses in 1923.

State	Percentage loss	State	Percentage loss
Texas	10	South Carolina	.5
Iowa	5	Illinois	.5
New Mexico	5	Florida	t
Alabama	2	Missouri	t
Mississippi	2	Kansas	t
Arkansas	2	Kentucky	general
New Jersey	2	California	general
Maryland	1		
Delaware	.5		

The control of black rot is being accomplished by the quite general use of seed treatment and certified slips. The use of such seed is mentioned by collaborators in Delaware, Mississippi, Arkansas, Missouri, Kansas, and New Mexico. Growers failing to treat their seed frequently lost heavily, one in Alabama reporting 40% loss. The results of the use of sulfur for the control of black rot and soft rot are reported by Adams of Delaware as follows:

Table 31. Results of treating soil with sulfur for sweet potato disease control.

	Percentage sound		Percentage black rot		Percentage soft rot	
	1st	2nd	1st	2nd	1st	2nd
Treated	62.3	83.8	27.4	6.3	10.6	9.8
Untreated	24.8	37.1	65.9	56.2	9.2	6.6

Soft rot caused by Rhizopus nigricans Ehr.

The storage disease has caused less loss than usual except in Alabama, Texas, and Arkansas, where losses of 10%, 20% and 25% respectively are reported. It was less serious than usual in New Jersey and Delaware. The losses as a rule came as a result of poor storage conditions in banks, and in uncured potatoes and those injured by grubs or wire worms. The disease was reported from New Jersey, Delaware, Florida, Alabama, Mississippi, Texas, Iowa, Missouri, Kansas, and Arkansas.

Recent literature

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Weimer, J. L. and L. L. Harter. Pectinase in the spores of Rhizopus. Amer. Jour. Bot. 10: 167-169. 1923.

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Scurf caused by Monilochaetes infuscans Hals.

The following losses were reported as due to scurf (soil stain) - 3%, New Jersey; 2%, Kansas; 1%, Alabama; 0.5%, Maryland; trace, Delaware, Kentucky, North Carolina, South Carolina, Florida, Mississippi, and California. The disease is widespread in the main sweet potato sections and seems to be especially severe where heavy applications of stable manure are used, and in sections where there is heavy rainfall during the setting period.

Poole, of New Jersey, reports good control from the use of sulfur broadcast at the rate of 300 pounds per acre. Adams, of Delaware, found 12% decrease in scurf where 150 pounds of inoculated sulfur was used per acre, and there was also an increase in yield of 62 baskets per acre.

Scurf occurs on all varieties of sweet potatoes, although Miles says that it was "apparently worse on Porto Rico than on Triumph," in Alabama.

Other diseases and injuries

White rust caused by Albugo ipomoeae-panduranae (Schw.) Swingle was common and widespread in 1923, but the actual damage was very slight. The amount of rust was increased where there were rains during the growing season. It was noted in New Jersey, Delaware, Florida, Alabama, Mississippi, Arkansas, and Porto Rico. Adams, of Delaware, made the following observations on varietal susceptibility:

> "The disease was prevalent on Big Stem, Little Stem, and Early Carolina. There was a trace on Triumph. No infections were observed on Nancy Hall, Southern Queen, or Porto Rico."

Pox or soil rot caused by Cystospora batata Elliott was more than usually prevalent in New Jersey, causing a loss estimated at 5%. Poole says he first saw symptoms of pox June 27 and thinks its development was favored by the dry weather. Tests with inoculated sulfur were partially successful and also increased the yield 10%. Pox is said to have caused a loss of 2% in Kansas, 1% in Texas and 0.5% in Maryland. Stokdyk, of Kansas, thinks the reduction in loss is due to the more general use of seed treatment. The results will, of course, be influenced by the amount of soil infection, soil type, and reaction.

Charcoal rot caused by Sclerotium bataticola Taub. was reported as of minor importance in New Jersey, South Carolina, and Texas, but very prevalent in Florida where Weber states it caused a loss of 2-4%, one of the important diseases of sweet potatoes in storage.

Java black rot caused by Diplodia tubericola (Ell. & Ev.) Taub. was reported from North Carolina, South Carolina, Florida, Alabama, and Texas. Stokdyk, reported it on seed shipped into Kansas from the South. The losses are estimated at 5-10% of stored crop in Florida, and 1.5% in Alabama, traces in the other states.

Leaf spot caused by Cercospora batatae Zimm. was present in Florida wherever sweet potatoes were grown. Weber states: "In most fields the plants were 100% infected but in no case was the disease observed to be of a serious nature."

Southern blight, caused by Sclerotium rolfsii Sacc. was reported by collaborators in New Jersey, South Carolina, Florida, Alabama, and Mississippi. Poole, of New Jersey says it is the first time they have noted it in the state. The losses were considerable in some instances, but resulted in no reduction of yield.

Damping-off caused by Sclerotinia sp. was reported from New Jersey, (see Pl. Dis. Reporter 7: 13. June 15, 1923). This is the first record of a Sclerotinia rot of sweet potato in New Jersey, according to Poole.

Damping-off caused by Rhizoctonia sp. was reported from Florida. Rhizoctonia sclerotia were found on Nancy Hall sweet potatoes bedded for sprouts in a greenhouse in New Jersey, but the fungus did not cause any rot of the tubers or sprouts (Pl. Dis. Reporter 7: 13. June 15, 1923).

Mottle-necrosis and internal breakdown are described by Harter, Lauritzen, and Weimer (1 and 2).

Storage rot not distinguished as to cause is reported by Temple and Jehle of Maryland to have caused a loss of 25% of the 1922 crop stored during the winter of 1922-1923. This is attributed to over-crowding and poorly constructed houses.

Other diseases and injuries reported were surface rot caused by Fusarium oxysporum Schlecht., New Jersey, Mississippi, Alabama; foot rot caused by Plenodomus destruens Harter, Maryland; dry rot caused by Diaporthe batatatis Harter & Field, Missouri; root rot caused by Ozonium omnivorum Shear, Texas (loss 6%); leaf-spots caused by Phyllosticta batatas Cke., New Jersey, Florida, Alabama, Porto Rico; and by Alternaria sp., California; so-called mosaic, cause unknown, Florida, Mississippi, Arkansas, Kansas (first report); root-knot caused by Heterodera radicicola (Greef) Müll., Arkansas, California; sooty mold caused by Meliola sp., Porto Rico (caused some loss); wet mold caused by Choanephora sp., Florida (caused death of many leaves; especially active in the mornings; not important); slime molds, Fuligo violacea and Physarum plumbeum, Alabama.

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DISEASES OF BEAN

Bacterial blight caused by Bacterium phaseoli EFS.

Bacterial blight was reported as more prevalent than usual only in Virginia, about the same as usual in Massachusetts, New York, West Virginia, Louisiana, Texas, Indiana, Minnesota, North Dakota, and Colorado, and less than usual in Delaware, Ohio, Illinois, Wisconsin, Iowa, and Arizona.

The estimated losses in Michigan were 10%; Virginia, 8-10%; New York, 3-10%; Alabama, 3%; South Carolina and Texas, 2%; Maryland, 1.5%; Minnesota and New Mexico, 1%; Delaware, .5%; and a trace or no estimate in the other states.

The dates of first recorded appearance are:

May- - - - Baton Rouge, La.
June 18- - Green County, N. Y.
June 18- - Floyd, Ind.
July 7 - - Calhoun, S. C.
July 19- - Woodside, Del.
July 20- - Madison, Wis.
July - - - Wayne Co., Ohio
July 25- - St. John, Ariz.
Aug. 15- - State College, N.M.
Sept.- - - Fort Collins, Col.

Varietal susceptibility is noted as follows: Chupp, of New York, says blight is most severe on White Kidney; Learn, of Colorado, says more blight on bush beans than pole beans; Gardner, of Indiana, says: "In a plot of 59 varieties, planted late, the following escaped infection: Golden-eye wax, Vicia faba, White Dutch Runner, Scarlet Runner, and only a trace occurred on Lazy Wife, Horticultural Cranberry, Rustless Golden Wax. Infection was noted on Dutch Caseknife as in 1921." The observations of Gloyer in New York agree with those of Gardner.

Burkholder (1) has recently published the results of three years' (1919, 1920, 1921) tests on the susceptibility of bean varieties to bacterial blight. He found that none of the varieties of the common bean possess immunity to blight, and discovered none that is highly resistant. There are, however, considerable, and apparently rather constant, differences in susceptibility. He stated also that as a rule, although not always, the resistant varieties are later in maturing, while those that are severely affected are early. Tables are given indicating the relative susceptibility of the varieties tested. Several other species of Phaseolus and other closely related genera were tested by inoculation experiments during 1919, and all were found to be more or less susceptible. They included Henderson's Bush Lima (Phaseolus lunatus), the white Tepary (P. acutifolius latifolius), the moth bean (P. aconitifolius), the Adzuki bean (P. angularis) the Mung bean (P. aureus), the California Black-eye cowpea (Vigna sinensis), the Ito San soybean (Soya max), and the Georgia velvet bean (Stizolobium deeringeanum).

Gloyer (2) has found that late planting reduces susceptibility to blight, and that there are two periods of susceptibility. "The first period begins with the germination of diseased seed and ceases with the formation of the third leaf. The second period begins at pod formation and continues until maturity. Some resistant varieties and crosses owe their resistance to the delay of pod formation until the cool days of September."

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Wilt caused by Bacterium flaccumfaciens Hedges

Bacterial wilt was reported by Coons as of considerable importance in Michigan. He thinks that it has been present in that state prior to 1923, but that it has not been distinguished from blight. Miss Hedges (1), of the United States Laboratory of Plant Pathology, has isolated the causal organism from seed secured in Michigan, South Dakota, Montana, Maryland, and the District of Columbia, France, and Germany. Previously it had only been reported from South Dakota.

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Anthracnose caused by Colletotrichum lindemuthianum (Sacc. & Magn.) Br. & Cav.

Anthracnose was much less prevalent in 1923 than for several years. This was attributed to the generally dry season. About the same amount as usual or slightly more was reported from Maryland, Mississippi, Alabama, and Louisiana, where rains occurred during the ripening of the spring crop. Gardner reported the first occurrence of anthracnose in the past four years in Indiana. Brown, of Arizona, says: "None reported. I have seen the disease only a few times here in Arizona in a period of fourteen years. I believe that disease-free seed could be grown profitably for use in other states."

Table 32. Prevalence of and losses from anthracnose of bean, 1923.

State	Prevalence	Percentage loss	State	Prevalence	Percentage loss
Vt.	less		Okla.	prevalent	
Mass.	less		Ark.	same	2
Conn.	less		Ohio	same	
N. Y.	much less		Md.	more	1
N. J.	much less		Wis.	less	t
Del.	much less	1	Minn.	same	t
W. Va.	same	4	Iowa	less	t
Va.	same	2	Mo.	local	t
Fla.	less	t	N. D.	same	t
Ala.	serious	4	N. M.	slight	2
Miss.	more	2	Ariz.	not reported	0
La.	same (slight increase)				

The variety Burpee Stringless Greenpod was reported as quite susceptible in Delaware. Adams stated that "One canner distributed 150 bushels of seed of that variety, all from the same source. Some of the growers brought in beans showing as much as 40% infection. It was estimated that the average infection was about 3%."

Burkholder (1) has described a new strain of the anthracnose fungus which he calls the gamma strain. This strain attacks both of the two most important varieties, Wells' Red Kidney and White Imperial, resistant to both the alpha and beta strains. It is closely related to the latter, and is believed by Burkholder to be a mutation from it.

Leach (2), using 15 cultures of Colletotrichum lindemuthianum from various sources, obtained at least 8 different biologic forms. Some of these react differently on only one or two varieties, but he believes that they should, nevertheless, be considered distinct. He found no significant differences in morphology nor in temperature relations of the various forms. The cardinal temperatures as determined in agar cultures were 0°C., 22.5°C., and 32-34°C. There was no increase in the virulence of any one form by constant association with a resistant host; and all efforts to break down the resistance of a variety by wounding, etc., failed. The age of the tissue inoculated influences the type of lesion produced on susceptible hosts, but does not affect the resistance of resistant varieties.

Literature cited

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2. Leach, J. G. The parasitism of Colletotrichum lindemuthianum. Minnesota Agr. Exp. Sta. Techn. Bul. 14: 1-41. March 1923.

Not Cited

Anon. Bean anthracnose. New Hampshire Agr. Exp. Sta. Bul. 208: 24, 25. 1923.

Experiments were made by W. L. Doran on the control of bean anthracnose by heating diseased seed for two hours at 80°C. (176°F.), by dusting and spraying with Bordeaux mixture, and by covering the plants during rainy weather until the cotyledons had fallen. Spraying with Bordeaux mixture gave better results than dusting, and covering the plants gave a very satisfactory degree of control. Heating diseased seed gave less protection.

Mosaic, cause unknown

This disease caused about the same amount of loss as usual. The following table will indicate the distribution and severity.

Table 33. Bean mosaic losses, 1923.

State	Loss %	State	Loss %
Conn.	2 reports	Ark.	same, 2-3%
N. Y.	less, t-5%	Ind.	most serious disease
Va.	increasing, t	Wis.	same, t-5%
Fla.	rare	Minn.	same, 1%
Ala.	scattered, t	Iowa	more, 5%
Miss.	common, 2%	Utah	more, 3%
Okla.	prevalent, t	Idaho	present, t
Md.	same, t		

Chupp reports that mosaic is becoming less important in New York because resistant varieties are being used. Gardner says mosaic is the most serious disease of beans in Indiana. It was noted on 38 out of 59 varieties in a test plot, including *Vicia faba*, Flageolet, Mexican Red, and Dutch Caseknife (*Phaseolus multiflorus*). Of the varieties escaping infection in 1921 and 1922, Black Valentine showed 2 mosaic plants out of 27, while Wardwell's Kidney Wax (25 plants) remained mosaic free.

Root and stem rot caused by *Fusarium* spp.

Root rot seems to be widespread on beans. The prevalence of this disease in 1923 was reported as follows:

New York	5-10%	Minnesota	trace
Virginia	6-10%	South Carolina	2%
Kentucky	universal	New Mexico	1%
Indiana	trace	Washington	trace
Maryland	same, trace		

In the last named state it was found by Heald to be causing severe injury in one field at Spokane. In California, *Fusarium* sp. and *Rhizoctonia* sp. together caused a loss of 3%. Fromme reports that the Bird Eye variety is severely affected. This is grown extensively (12,000 cases) as a dry shell bean in southwest Virginia. Gardner reports the results of a demonstration test in Kentucky as follows:

Red Valentine	no injury	Refugee wax	80% failure
Burpee's Stringless Greenpod	no injury	1000 to 1	failure

The organism was reported as *F. martii phaseoli* Burkholder in New York, as probably that species in Indiana; and in Washington as apparently identical with it. This would make the first report from Washington.

Root rot and canker caused by *Rhizoctonia* sp.

This type of root rot was reported locally from Massachusetts, New York, Florida, Alabama, Louisiana, Texas, Colorado, Idaho and California. It seems to be especially severe on summer and fall plantings in Louisiana and Texas, where Taubenhaus reports that no snap beans are grown in the summer on account of Rhizoctonia and Fusarium, which generally kill out the stand. Weber, of Florida, reports: "This type of stem trouble associated with wet weather. A fifteen acre field near Hastings was a total loss and several fields in the vicinity suffered 40%-80% loss. The plants were killed while in the 4-6 leaf stage. The fungus weakened the stem so that the plants fell over while yet green and healthy looking."

Rust caused by *Uromyces appendiculatus* (Pers.) Lév.

This disease was of the usual minor prevalence with the exception of New Mexico, where Crawford estimates a loss of 10%. It generally appears late in the season, hence the small amount of loss. Fromme, of Virginia, says it is general on susceptible varieties but does not seriously affect commercial fields because resistant varieties are grown.

The following reduction in yield is estimated from the different states from which reports were received: New Mexico, 10%; Louisiana, 2-3%; California, 2%; Virginia and West Virginia, 1%; New York, Maryland, North Carolina, South Carolina, Florida, Alabama, Mississippi, Ohio, Iowa, Missouri, and Colorado, only a trace of occurrence with practically no loss.

The Kentucky Wonder variety is reported as most susceptible from New York, Louisiana, Missouri, and Colorado. Milbrath says the rust is particularly severe on Black-eye string beans and Pink beans in California. The only control for rust seems to be the use of resistant varieties and early planting to escape the disease.

Other diseases

Stem blight caused by *Macrophoma phaseoli* Maubl. was important locally in South Carolina. The beans in this case were partly Kentucky Wonders and partly bush beans.

Southern wilt caused by *Sclerotium rolfsii* Sacc. was reported as scattered in Florida and Texas, doing from a trace to 2% damage. Weber, of Florida, says that this disease was most destructive in May and June, or whenever the pods come in contact with the soil.

Dry weather caused considerable stunting of beans in Wisconsin and Minnesota.

Frost which occurred over wide areas of the southern states February 19, 1923, caused considerable loss to the bean crop maturing at that time.

Other diseases and injuries reported are *powdery mildew* caused by *Erysiphe polygoni* DC., Connecticut, New York (on greenhouse beans), Texas, California (about 1% loss); *leafspot* caused by *Cercospora cruenta* Sacc., Florida, Texas; *watery soft rot* caused by *Sclerotinia libertiana* Fckl., New York, West Virginia; *root rot* caused by *Ozonium omnivorum* Shear, Texas (caused 10% reduction in yield in black lands); *black root rot* caused by *Thielavia basicola* (B. & Br.) Zopf., New York; *root knot* caused by *Heterodera radicicola* (Greef) Müll., Texas (2% reduction in yield; greatest loss in sandy loam soils); *chlorosis* due to too much lime in the soil, Texas, (caused 1% reduction in stand).

DISEASES OF LIMA BEANS

Downy mildew caused by Phytophthora phaseoli Thax. was reported as less prevalent than usual in New York, New Jersey, Pennsylvania and Ohio due to the dry season. In New Jersey it was severe late in the summer in some sections, but did not occur on the early crop. It was more severe than usual in sections of Delaware and Kentucky, where local rains made conditions favorable for infection. Some of the fields in New Castle County, Delaware showed 50% pod infection.

Bacterial spot caused by Bacterium viridifaciens W.B.T. (2) was reported from New York, Indiana, and Wisconsin. Chupp, of New York, says: "I worked with this organism since 1918 when it was first observed on lima beans in war gardens at Ithaca. My results were substantially the same as those published recently by Tisdale." Gardner, of Indiana, thinks that this organism is probably identical with Bacterium vignae on cowpeas.

Pod rot attributed to Botrytis cinerea Pers. with a question mark was reported at Irvine, California, August 24 by Harter and Weimer.

Pod blight caused by Diaporthe phaseolorum (C. & E.) Sacc. was reported from New Jersey, Delaware, South Carolina (one report), and for the first time from Mississippi. Adams says it was much more prevalent in Delaware than last year owing to wet weather.

Mosaic (cause unknown) was reported as of more than the usual prevalence in Delaware and constituting a problem of increasing importance. Its occurrence was also noted in Oklahoma.

Powdery mildew caused by Erysiphe polygoni DC. was reported from Connecticut and California (common in Venturia, Santa Barbara, and Santa Ana Counties).

The tobacco wildfire organism, Bacterium tabacum Wolf and Foster was reported on lima beans in Massachusetts (Pl. Dis. Reporter 7:47. Aug. 1, 1923).

Yeast spot caused by Nematospora phaseoli Wing. was reported from Illinois for the first time. The seed for this crop came from California two years ago. (1)

Root rots caused by Rhizoctonia sp. and Verticillium sp. were observed in California by Harter and Weimer.

Drought conditions caused considerable loss to the mid-season crop in Delaware.

Literature cited

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2. Tisdale, W. B. Bacterial spot of lima bean. Jour. Agr. Res. 25: 141-153. July 21, 1923.

DISEASES OF ONION

Smut caused by Urocystis cepulae Frost

This disease occurred in about the usual amounts in Massachusetts, New York, Ohio, Indiana, and Illinois. It was less prevalent than usual in Wisconsin, seen for the first time since 1916 in Kansas, and reported for the first time in Minnesota. Coons, of Michigan, says smut is not known in that state. The formaldehyde drip treatment caused damage in some fields in Massachusetts where, according to Anderson, "Owing to the dry condition of the soil at the time of application there was considerable injury to the seed from this source."

Recent literature

Anderson, P. J. The relation of soil moisture to formaldehyde injury of onion seedlings. Phytopath. 13: 392-403. Sept. 1923.

________________Susceptibility of species of Allium to onion smut. (Abstract). Phytopath. 14: 26. Jan. 1924.

________________ and A. V. Osmun. An improved formaldehyde tank for the onion drill. Phytopath. 12: 161-168. 1923.

Walker, J. C. and F. L. Wellman. Temperature relations of Urocystis cepulae (Frost). (Abstract). Phytopath. 14: 26. Jan. 1924.

Other diseases

Neck rot caused by Botrytis allii Munn, was reported as less prevalent than usual in New York, Ohio, Indiana, Wisconsin, Idaho, and Washington. The dry season is considered to be in part responsible for the improved condition.

White rot caused by Sclerotium cepivorum Berk. on multiplier onions was reported from Norfolk, Virginia. This is a common European disease, but only one other authentic report of its occurrence in this country had been made, from Oregon in 1918, according to Walker (4).

Fusarium bulb rot caused by a fungus closely resembling Fusarium cepae Hanzawa is said to be commonly destructive in the onion set growing sections of Illinois. (2). A Fusarium bulb rot was reported as less common than usual in Wisconsin, and a small amount was reported from Minnesota and Idaho.

Pink root caused by Fusarium malli Taub. was reported from New York (3-7%), Louisiana, (same as usual), Texas (4%), Washington, (severe in Walla Walla section), California, (widely prevalent with losses from 2 to 80% per field, especially severe in the Delta region). Rosa, of California, says: "One of the most serious aspects of this disease is the infection of bulbs intended for seed production."

Smudge caused by Colletotrichum circinans (Berk.) Vogl. was reported on White Portugal and Southport White Globe from Delaware. It was also noted in Wisconsin and Illinois, chiefly on white sets. The results of recent investigations on resistance to onion smudge have been presented by Walker (3). He states that in general white varieties are susceptible and colored varieties are resistant. Apparently resistance depends on the presence of some substance associated or identical with the coloring matter in the dry outer scales of resistant bulbs. The inner succulent scales of bulbs of colored varieties were attacked as readily as with white forms. All varieties tested in the seedling stage were equally susceptible.

Mold caused by Macrosporium parasiticum Thüm. was reported from New York, Minnesota, Louisiana, Florida, and Porto Rico. In the southern section of

Louisiana it was very severe, causing in some cases a 100% infection with a 50% loss of seed crop. It was widely prevalent or upper leaves and seed stalks in Florida but was not considered of serious importance.

Downy mildew caused by Peronospora schleideni Ung. was of local occurrence in low, poorly drained areas in New York, Louisiana, Ohio, and California.

A new leafspot of onion and garlic has been described by Welles (5) as Cercospora duddiae. The disease, which causes severe injury, especially to garlic, has been noted since January, 1922 at the College of Agriculture, Los Baños, Philippine Islands.

Frost on February 14, 1923 did considerable damage to the Texas onion crop in the Laredo district. Taubenhaus considers the freeze responsible for the many splits and doubles which occurred.

Other diseases reported were black mold caused by Aspergillus niger van Tieghem, Texas (1% loss to onions in transit); crown rot caused by Sclerotinia sp., California (new to state (1); soft rot caused by Bacillus carotovorus Jones, Ohio, Indiana; bacterial heart rot, Ohio (frequently seen on the markets but not reported by growers); leafspot caused by Botrytis cinerea Pers., Florida (caused considerable foliage loss near Gainesville); dodder (Cuscuta gronovii Willd.), New York, Delaware.

Literature Cited

1. Smith, E. H. Some diseases new to California. (Abstract). Phytopath. 14: 125. Feb. 1924.

2. Tims, E. C., and J. C. Walker. A Fusarium bulb rot of onion. (Abstract). Phytopath. 14: 26-27. Jan. 1924.

3. Walker, J. C. Disease resistance to onion smudge. Jour. Agr. Res. 24: 1019-1039. June 23, 1923.

4. ____________ Occurrence of white rot of Allium (Sclerotium cepivorum Berk.) in Europe and America. (Abstract). Phytopath. 14: 26. Jan. 1924.

5. Welles, C. B. A new leaf spot disease of onion and garlic. Phytopath. 13: 362-365. Aug. 1923.

DISEASES OF CRUCIFERS

CABBAGE

Clubroot caused by Plasmodiophora brassicae Wor.

This disease was of about the same or slightly less prevalence in 1922 as in previous years. The collaborators in New York and Minnesota each estimated a 2.5% loss. The reports were of a trace of loss in Massachusetts, New Jersey, Maryland, Pennsylvania, Ohio, Indiana, Illinois, Michigan, Wisconsin, Iowa, and North Dakota. Clubroot was not reported from any southern state. It was observed both in seedling and mid-summer stage of plant development. Chupp, of New York, reports an interesting observation on control, "Reed Brothers, well known cabbage growers, state that on their farms a six year rotation, with cruciferous weeds absent, will eradicate the slime mold."

Gloyer and Glasgow (1) have reported that the development of the disease may be prevented by one application of mercuric chloride solution (1-1280) to seedlings in the seed-bed. Other solutions tried had no effect.

Monteith (2) has studied the relation of soil moisture and temperature to infection of cabbage seedlings by the clubroot organism. He concludes that temperatures favorable to the growth of the cabbage plant have little effect on the development of clubroot. The optimum temperature for the disease is the same as that for the normal development of the host. Soil moisture, however, is an influential factor. Infection occurs at a moisture content of about half the water-holding capacity of the soil; below that the disease does not develop; above it it increases in severity with higher moisture content up to saturation.

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Miller, Herman (Thurgau) and A. Osterwalder. Weitere Versuche zur Bekampfung der Kohlhernie. Landw. Jahrb. Schweiz 37: 153-182. 1923.

Yellows caused by _Fusarium conglutinans_ Woll.

The yellows disease was of more than usual prevalence in Long Island, New Jersey, Delaware, Maryland, Mississippi, Texas and Illinois. It was reported from California for the first time (1).

Table 34. Distribution, prevalence, and losses of cabbage due to yellows in 1922 and 1923.

State	Prevalence		State	Prevalence	
	1922	1923		1922	1923
N. Y.	Present	Major on Long Island	Ark.	Same .15%	
N. J.		More in South	Ohio	Limiting factor	Same
Pa.	Present	Somewhat less			
Del.	.5%	Increasing	Ind.	More .5%	Less 3%

State	Prevalence		State	Prevalence	
	1922	1923		1922	1923
[illegible]	Same	.8%	Ill.	5.	More 5.5%
N. C.		Less	Mich.	Very serious	
S. C.	Trace		Wis.	More	Less
Ala.		Important	Iowa	.25%	.25%
		2.5%	Mo.	Less, 10%	Less
Miss.	General	1 (much	N. D.	Present	Less
		more)	Kans.	More .35%	As usual
Tex.	.18%	.20%	Col.	Present	
			Mont.	Present	

The hot summer and delay in the maturity of the southern cabbage crop to bring it into hot weather were contributing factors in the increase in severity of cabbage yellows. Clayton reports as high as 60% infection in some fields in Nassau County, Long Island. In Camden County, New Jersey, one field of Copenhagen showed 66% infection and another 96%. Adjoining rows of Early Jersey Wakefield showed less. Temple says that losses of 20 to 50% are much more common in Maryland than formerly. The explanation for the relatively less amount of yellows in Indiana may be found in the better distributed rainfall, which tended to keep the soil temperature lower than in neighboring states of Ohio and Illinois. Two new locations for yellows were observed in Wisconsin, one in Rock County and another in Grant County. White says it is coming to be difficult to find a cabbage field in Kansas that does not have yellows. Yellows was not observed in North Dakota, although it has been reported in previous years.

Recent Literature

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Shannon, Harry. The history and extent of Fusarium wilt of cabbage yellows in the Nichols-Muscatine district. Rep. Iowa State Hort. Soc. 57: 438-439. 1923.

Stokdyk, E. A. Progress report on cabbage yellows investigations in Kansas. (Abstract) Phytopath. 14: 24. Jan. 1924.

Wisconsin All Seasons and Wisconsin Brunswick are resistant if started in greenhouse or hot bed and transplanted but sometimes show yellows when sown directly in the field. Iowa Copenhagen is also giving satisfaction. Three varieties from Scotland gave some resistance. Seed transmission was not shown. F. conglutinans callistephi Beach causing aster wilt failed to cause yellows in cabbage.

Tisdale, W. B. Influence of soil temperature and soil moisture upon the Fusarium disease in cabbage seedlings. Jour. Agr. Res. 24: 55-86. 1923. Abs. in Exp. Sta. Record 49: Dec. 15, 1923.

Black rot caused by Bacterium campestre (Pammel) EFS.

Black rot was as a rule less severe in 1923 than 1922. Exceptions where more of the disease was reported are Louisiana, Texas, Indiana, and Illinois. In Maryland, black rot was about the same as usual. The low rainfall in New York and Wisconsin is thought to be one reason for the decrease in amount of black rot in those states. Then too, the corrosive sublimate seed treatment, which is being adopted in several sections of Wisconsin, is showing good results. In Illinois, Tehon reports black rot as about equal to yellows in importance and to have been reported from 17 counties which comprise all the trucking districts. In some fields near Chicago nearly every plant was destroyed.

Table 35. Estimated loss from and dates of earliest appearance of black rot of cabbage, 1923

State	Percentage loss	Date and locality of first appearance
Massachusetts	trace	---
New York	trace-2	September 17, Tompkins County
Delaware	0.5	July 26, Seaford
Maryland	trace	---
Alabama	0.5	---
Mississippi	5.	April 30, Washington County
Louisiana	1-5	January, Baton Rouge
Texas	4.	---
Ohio	one report	August 29, Stark County
Indiana	--	June
Illinois	4.	June 23, Quincy, Adams County
Wisconsin	2.	August 30, Stanley
Iowa	trace	---
North Dakota	trace	---

Blackleg caused by Phoma lingam (Tode) Desm.

Blackleg was less serious in 1923 than in 1922 with the exception of North Carolina, Indiana, and Minnesota. The estimated reduction in yield in

Minnesota was 3% of the crop. Chupp says blackleg was much less prevalent in New York, due partly to the dry weather and partly to the greater use of the hot water seed treatment in the Long Island section. There was about the same amount as usual in Maryland where it caused 1.5% loss. This disease was serious locally in Massachusetts. Osmun reported one field that had 90% plants damaged. The explanation for the increase of blackleg in North Carolina as given by Fant is an increase in concentration of cabbage growing and neglect of rotation given to this crop. Tisdale, of Florida, found blackleg in a field of cabbage plants that had recently been set with plants from a seed company near Charleston, South Carolina. Melhus says that blackleg has been practically eradicated in Iowa by seed treatment and seed bed rotation.

The control of blackleg infection in the seed can best be secured by using hot water treatment 50°C. for 30 minutes, according to the results obtained by Clayton (1) and by Walker (2). Clayton notes further that plants from the hot water treated seed stood transplanting with least loss and made the most uniformly vigorous growth in the field. This treatment was compared with the use of Bordeaux and of corrosive sublimate in both hot and cold solutions.

References

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2. Walker, J. C. The hot water treatment of cabbage seed. Phytopath. 13: 251-253. 1923.

Other diseases

Black mold or leafspot caused by Alternaria brassicae (Berk.) Sacc. was reported as more prevalent than usual in Illinois where it caused reduction in yield of .5%, chiefly in the southern part of the state. It was about the same as usual in Delaware, South Carolina, Florida, Alabama, and Louisiana, and less in New York and Wisconsin. In none of these states was there loss enough to estimate. Weber, of Florida, notes one case where leafspot caused damage on a crop that was not marketed until after warm weather had developed.

Downy mildew caused by Peronospora parasitica (Pers.) DeBary was reported present on cabbage seedlings and half grown plants in South Carolina, Florida, Louisiana, Texas, and Wisconsin. It was very scarce in Wisconsin and was not reported at all from Iowa and New York this season.

Slimy soft rot caused by Bacillus carotovorus Jones was important on mother seed plants in New York and Wisconsin. It is one of the limiting factors of cabbage seed growing in the central states as the rot usually starts following the unavoidable bruises of storage and handling. Soft rot also caused considerable loss in southern grown cabbage in transit from Alabama, Florida, Mississippi, Louisiana and Texas. Miles, of Alabama, writes: "Slight loss in field. Heavy loss in transportation. Several cars showed 75% stock decayed when reaching northern market, average of 35 cars was 25% showing trouble from this cause slight to serious." Neal and Barker, of Mississippi, attribute the severe losses to excessive rainfall during the growing and shipping season. There was less than the usual amount of soft rot in fields in Ohio and Wisconsin but more in Maryland causing a loss of 1%.

Watery soft rot caused by Sclerotinia libertiana Fcl. was reported only from New York and Louisiana. Chupp, of New York, says it was particularly common in the Geneva-Phelps district on late harvested Krout cabbage, estimated loss to the state 2%. About the same loss, 2%, occurred in Louisiana. The period of greatest injury in Louisiana was January to March.

Root rot caused by Rhizoctonia sp. was reported as severe in the University breeding plots at Cornell on one strain only. Rhizoctonia sp. caused a seedling rot or damping-off in Indiana, and a summer rot in California.

Olpidium brassicae (Wor.) Dangeard was found on roots of tomato, tobacco, and cabbage plants in a greenhouse in the University of Wisconsin. This is the first time it has been reported in this country. (1); leafspot caused by Bacterium maculicolum McCulloch, Louisiana; blotch caused by Cercospora bloxami B. & Br., Florida; ring-spot caused by Mycosphaerella brassicicola (Duby) Lindau, western Washington (common as usual on the seed crop - J. C. Walker); damping-off caused by Pythium sp., Florida (considerable damage in seed beds); southern blight caused by Sclerotium rolfsii Sacc., Texas; root-knot caused by Heterodera radicicola (Greef) Müll., Alabama (loss 1%), Texas (loss 2%): seedling blight probably due to sunscald, Florida; bursting due to continued rains and warm weather, Wisconsin (more loss than usual from this cause).

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BRUSSELS SPROUTS

Black rot caused by Bacterium campestre (Pammel) EFS. was reported by Clayton on Long Island. He reports the result of seed treatment for the control of this disease as follows: (See Cabbage, blackleg, reference 1).

> "Check, primary systemic black rot 37.8%. $HgCl_2$, 1 to 1000, seed soaked 30 min. 18.6%. Hot water 50°C., seed soaked 25 and 33 min., none. $HgCl_2$; 1 to 1000 applied 3 times to plants in bed as for maggot control, none. Bordeaux 4-5-50 applied to plant bed as $HgCl_2$, 22.3%."

CAULIFLOWER

Black rot caused by Bacterium campestre (Pammel) EFS. was reported as general in New York, but causing less damage than usual; loss ranging from a trace to 1%. In Illinois Tehon reported more than usual especially in the northern part; loss .5%.

Clayton (1, 2) states that cauliflower is very susceptible to this disease, which is very destructive on Long Island. Seed infection is probably the main means of overwintering of the organism, but it may also overwinter in the stems of diseased cabbage and brussels sprouts plants which happen to survive. Insects are apparently the most important means of dissemination, particularly aphids. The disease may be controlled perfectly by the hot water treatment, 122°F. for 25 to 33 minutes, but this method reduces the germination of the seed. Excellent control in the seedbed is secured by three applications of corrosive sublimate solution (1 to 1,000 or 1 to 1,200). Late planting so that the crop develops during the cool fall months is recommended as a method of escaping black rot, since it is a warm weather disease.

Clubroot caused by Plasmodiophora brassicae Wor. was important in occasional fields in New York where cauliflower or cabbage seed had been grown for some time; losses, trace to 2%. The reduction in yield in Maryland was estimated at 5%, about as usual. Clayton states that the fact that this disease rarely causes appreciable losses on Long Island is due entirely to the care with which growers rotate cruciferous crops. (2).

Blackleg caused by Phoma lingam (Tode) Desm. was reported as much less than usual in New York. The Pierstorff variety showed 40% infection in one field in Monroe County.

> According to Clayton (2), cauliflower is not so badly attacked by blackleg as are cabbage and brussels sprouts on Long Island. This disease also is perfectly controlled by the hot water seed treatment as for black rot. The amount of blackleg is also greatly reduced by seed treatment with corrosive sublimate solution, 1 to 1000 for 30 minutes. Seedbed treatment with corrosive sublimate solution (see black rot) was next in effectiveness to the hot water seed treatment, but the latter method gave more vigorous plants.

Leafspot caused by Alternaria brassicae (Berk.) Sacc. was reported as a minor disease in New York and Florida. Weber, of Florida, says it did not prove serious except on plants that were planted late. It was most serious in April.

"Whiptail" is a non-parasitic disease of cauliflower which is very troublesome on Long Island, and is considered by Clayton (2) to be due to unfavorable soil conditions. The loss to Long Island growers in 1923 was estimated at 20 percent. Heavy fertilizing may cause whiptail, as is shown by the fact that in the experimental plats those receiving applications of high-grade commercial fertilizer at the rate of one ton to the acre had more whiptail than unfertilized plats. Where lime was broadcast at the rate of 3,600 pounds per acre just before setting the plants, the bad effect of the fertilizer was largely overcome. The greatest amount of whiptail was observed where the soil had previously been treated with inoculated sulfur for potato scab control. Some growers have designated different fields for rotation with potatoes where sulfur may be used, and other fields with cauliflower where lime may be applied.

Peppery spot caused by Bacterium maculicolum McCulloch, Long Island, New York; downy mildew caused by Peronospora parasitica (Pers.) DeBary, New York; watery soft rot caused by Sclerotinia libertiana Fckl., Louisiana.

Literature Cited

1. Clayton, E. E. A progress report on black rot investigations, with special reference to cauliflower on Long Island. (Abstract). Phytopath. 14: 24. Jan. 1924.

2. Clayton, E. E. Investigations of cauliflower diseases on Long Island. New York (Geneva) Agr. Exp. Sta. Bul. 506: 1-15. Jan. 1924.

CHINESE CABBAGE

Soft rot caused by bacteria, Missouri (severe damage confined to leaf bases of plants from a nursery in Pike County).

Leafspot caused by Cercospora bloxami B. & Br. was reported by Weber near Jacksonville, and St. Augustine, Florida. In one ten-acre field a 60% loss was reported. Plants were attacked from seedling stage to maturity.

COLLARDS AND KALE

Downy mildew caused by Peronospora parasitica (Pers.) DeBary, South Carolina, Florida; southern blight caused by Sclerotium rolfsii Sacc. Harrison County, Mississippi; yellows caused by Fusarium conglutinans Woll. was reported on cabbage and kale from California for the first time (Smith, E. H. Some diseases new to California. (Abstract). Phytopath. 14: 125. Feb. 1924.)

HORSE RADISH

Root rot caused by Thielavia basicola (B. & Br.) Zopf. was reported by Poole as causing slight loss in New Jersey. The quality of harvested roots was somewhat reduced.

Mosaic, cause unknown, Nassau County, New York, June 11; determined by K. H. Fernow.

White rust caused by Albugo candida (Pers.) Ktz., New York; leafspot caused by Cercospora armoraciae Sacc., Illinois, Missouri, Oklahoma; by Ramularia armoraciae Fckl., New York (very severe in Tompkins County, probably statewide); by Macrosporium herculeum E. & M., New Jersey; bacterial storage rot, New Jersey.

KOHL RABI

Downy mildew caused by Peronospora parasitica (Pers.) DeBary was reported by Weber as common in several gardens near Gainesville, Florida, but it did not appear to be doing any damage.

MUSTARD

White rust caused by Albugo candida (Pers.) Ktz. was reported from Cassville, New York; Calhoun, South Carolina; Florida; and Hurds County, Mississippi. In each case the damage was slight.

RADISH

Black root caused by Nematosporangium aphanidermatum (Edson) Fitz. (1) was noted locally at Indianapolis and Fayette, Indiana. White Chinese showed some resistance in a test plot of 22 varieties on "sick" soil. Kendrick (2) has found that the main avenue of infection by this fungus appears to be the point where the secondary root emerges from the cortex of the primary root. He also found evidence of systemic infection.

Damping-off caused by Mucor sp. was reported by Clinton in Connecticut. It is said to be the first occurrence in that state. It occurred under conditions of high moisture.

White rust caused by Albugo candida (Pers.) Ktz., New York, Oklahoma, Illinois, Wisconsin, Colorado; downy mildew caused by Peronospora parasitica (Pers.) DeBary, New York, California; powdery mildew, species not determined, Missouri.

Literature Cited

1. Fitzpatrick, H. M. Generic concepts in the Pythiaceae and Blastocladiaceae. II. Rheosporangium aphanidermatum Edson. Mycologia 15: 167-168. July 1923.

Rheosporangium aphanidermatus Edson and Pythium butleri Subramaniam are the same fungus. Edson's specific name antedates Subramaniam's, and the author proposes two new combinations, Pythium aphanidermatum and Nematosporangium aphanidermatum, but prefers the latter.

2. Kendrick, J. B. Infection-court in radish black root. (Abstract). Phytopath. 14: 66. Jan. 1924.

RUTABAGA

Black rot caused by Bacterium campestre (Pammel) EFS. was reported as minor in Madison, Wisconsin.

Powdery mildew caused by Oidium balsamii Mont. was reported from Florida, and said by Weber to be coextensive with the host and in certain instances causing total loss of the plants.

Downy mildew caused by Peronospora parasitica (Pers.) DeBary, Gainesville, Florida.

TURNIP

Anthracnose caused by Colletotrichum higginsianum Sacc. was reported of minor importance in Florida but causing a 1% loss in Alabama.

Powdery mildew caused by Oidium balsamii Mont. was reported from Florida. "Was common on both surfaces of the leaves of turnips. In some instances the leaves were totally covered and killed. It was especially destructive in March and April." (Weber).

Soft rot caused by Bacillus carotovorus Jones, New York, Florida; crown gall caused by Bacterium tumefaciens EFS. & Towns. Kansas; black rot caused by Bacterium campestre (Pammel) EFS., Louisiana, Colorado; white rust caused by Albugo candida (Pers.) Ktz., Alabama, Texas; downy mildew caused by Peronospora parasitica (Pers.) DeBary, Florida.

DISEASES OF CUCURBITS

CANTALOUPE

Leaf blight caused by Macrosporium cucumerinum Ell. & Ev.
(Alternaria brassicae nigrescens Pegl.)

Leaf blight was reported from Connecticut, New Jersey, Pennsylvania, Delaware, the coastal plain of Maryland (10%), Texas (5%), Ohio (trace), Indiana (serious), Michigan (very severe in early September), and Missouri (one report). In cases where the damage was slight the fungus was retarded in its development by dry weather. According to Brisley (1), leaf blight has caused severe damage to cantaloupes in Arizona. Beach reports a loss of 33% in a three acre field in Delaware County, Pennsylvania. Adams stated that in Delaware:

> "Leaf blight is the most important disease affecting the Eden Gem variety, which shows good resistance to downy mildew. The Hybrid No. 2 variety is next in susceptibility. The commercial varieties grown in the state are practically resistant to this disease. The copper-lime-arsenate dusts have given practically complete control. It was more prevalent than last year and was found about two weeks earlier (July 20) than downy mildew."

Reference

1. Brisley, H. R. Studies on the blight of cucurbits caused by Macrosporium cucumerinum E. & E. Phytopath. 13: 199-204. 1923.

Wilt caused by Bacillus tracheiphilus EFS.

Wilt was reported as somewhat more than usual in prevalence in Connecticut, New York (2-5%), Illinois (1.5%), and Iowa (8%). It was about the same as usual in Pennsylvania, Maryland, Ohio, Michigan, and Wisconsin, and less in Kentucky and Indiana. Young, of Ohio, says: "Especially serious where melons or cucumbers have been repeatedly grown on the same land. Crop rotation, together with control of insects, has proved effective in preventing serious loss." Valleau says that in Kentucky very marked results have been obtained in the control of cucumber beetles, and hence of wilt, through the use of nicotine dusts.

Anthracnose caused by Colletotrichum lagenarium (Pass.) Ell. & Hals.

Anthracnose was noted from New York to Arizona and south to Florida and Alabama. The greatest losses are reported from Alabama, 10%, Minnesota and Iowa, 5%, New York and Illinois 1%. Other states reporting are: Delaware, Maryland, Virginia, South Carolina, Mississippi, Illinois, Michigan, Wisconsin, Iowa, Missouri and Colorado.

The severity of the disease seemed to coincide with periods of rain. In New York it developed late, September 24, on mature fruit and in Delaware early, July 27, on young immature fruit. It caused a spotting both on leaves and fruit. Weber says: "Anthracnose proved to be one of the most serious diseases of the host plant in Florida during the past season. It was found in the early part of April and developed rapidly until June, the end of the growing season of the cantaloupe. In several fields near Jennings and Williston it caused 10 to 20% loss. Attempts to control the fungus with copper lime dust did not prove satisfactory." Tehon says that in Illinois it is the most important cantaloupe disease next to wilt and may sometimes be more important. Losses as high as 30% are noted.

The Eden Gem, Pearl Pink, and Hybrid No. 2 have some resistance in the order named according to Adams, Delaware. Temple, of Maryland, reports Honey Dew as most severely attacked.

Mosaic (cause unknown)

Mosaic was reported as very prevalent in Delaware and on the increase from last year. It is now one of the most important diseases in that state according to Adams. It was also considered the worst cantaloupe disease in Indiana. Gardner says: "In Knox County, Indiana, heavy aphis infestation was followed by mosaic, too late, however, to ruin the fruit. The mosaic carriers, milkweed, pokeweed, and Physalis are abundant in Indiana." A few cases were noted in Ohio and somewhat more than usual in Illinois and Wisconsin. In Iowa there was about the same amount as usual, with a loss of 5%. The dates of first recorded appearance are: June 20, Delaware; July 11, Illinois; July 17, Indiana; August, Ohio.

Downy mildew caused by Pseudoperonospora cubensis (B. & C.) Rostow

Downy mildew was reported as less common and severe than last year in Delaware (25% loss) and Maryland (2.5% loss), but much worse than last year in South Carolina, Georgia, and Florida. In South Carolina it was first seen June 21 and by July 10 the vines were dead. The crop was almost a total loss, 95%. In Alabama, Mississippi, and Louisiana the disease was present but the epidemic came so late that the damage was not extensive. A 5% loss is estimated for Alabama. The downy mildew fungus was noted for the first time on cantaloupe in California, where it was collected September 12 by Harter and Weimer at Garden Grove.

The control of downy mildew depends much upon the weather, as the disease is stimulated by rains and lack of sunshine. Weber, of Florida, reports that the use of copper fungicides helped some in checking the disease but was not thoroughly efficient. On the other hand in Delaware Adams reports: "Copper-lime-arsenate dust proved very effective in checking the disease. The dusted vine matured a normal crop while untreated vines set hardly 75% of a normal crop. Approximately two hundred acres of cantaloupes were dusted this season as compared with less than ten acres in 1921." Under Delaware conditions the Pearl Pink variety showed greater resistance to downy mildew than Pollock or Hybrid No. 2. The Eden Gem showed best resistance but was very susceptible to leaf blight, *Macrosporium cucumerinum*.

Other diseases

Fusarium wilt caused by *Fusarium* sp. (*niveum*? *vasinfectum*?) was reported as a trace in Delaware, of some importance in Illinois and California, and very important in New Mexico where Crawford estimates a loss of 15%. He states that the temperature and moisture were both above normal and that all commercially grown varieties were equally susceptible.

Root knot caused by *Heterodera radicicola* (Greef) Müll. was reported as causing losses of 1% in Alabama, 2% in Texas, 6% in California, and a trace in Missouri. The infection in Missouri was in sandy lowlands in the southeastern part of the state.

Sun scorch or *spray injury* was reported July 22 from Meriden, Connecticut. This was caused by spraying in weather too hot and bright.

Cracked melons were more or less common in the latter part of the season, where rains followed dry weather in Connecticut and Wisconsin.

Two *leafspots* were reported from Delaware for the first time, *Cladosporium cucumerinum* E. & A., also noted in Colorado, and *Septoria cucurbitacearum* Sacc. *Cercospora cucurbitae* Ell. & Ev. was also reported from Delaware; *powdery mildew* caused by *Erysiphe cichoracearum* DC. from Connecticut, Florida, and Georgia (caused extensive loss in vicinity of Valdosta); *southern blight* caused by *Sclerotium rolfsii* Sacc., from Alabama (2% loss), and Texas (1% loss); *soft rot* caused by *Bacillus melonis* Giddings, from Virginia

CUCUMBER

Wilt caused by *Bacillus tracheiphilus* EFS.

Bacterial wilt was present in the eastern central, and southern states. It was reported more serious than usual in Illinois and Iowa and less than usual in Wisconsin and Minnesota; in other places about the same.

Table 36. Bacterial wilt of cucumber, relative prevalence, losses, and first appearance.

State	Importance	Loss %	First appearance	Place
N. H.	---	---	August 9	Manchester
Mass.	rather more	small	---	---
Conn.	usual	---	---	---
N. Y.	same	2.5	July 10	Monroe County
N.Y.(L.I)	more	25 in some fields	---	---

State	Importance	Loss %	First appearance	Place
N. J.	present	trace	---	---
Md.	same	trace	August 20	Mickleton
Fla.	not common	trace	---	---
Ala.	" "	trace	---	---
Miss.	" "	trace	June 16	Stone County
Texas	usual	2	---	---
Ohio	usual	---	June 18	Stark County
Ind.	less	---	July 24	Lake County
Ill.	much more; 60% 1 field	2.5	July 18	Clinton County
Wis.	less	1.0	July 10	Madison
Minn.	less	---	---	---
Iowa	more	14	---	---

There were no observations on control or varietal resistance in connection with the wilt disease.

Mosaic, cause unknown

This disease continues to be one of the widespread and destructive diseases of cucumber. It was reported as of increasing importance on Long Island, New York and in Delaware, Indiana, and Illinois. It was said to be the major disease of the crop in Wisconsin, causing a loss of 15%, although less prevalent than in 1922. It was reported about the same as usual in Massachusetts, New York, Maryland, Florida, Louisiana, Ohio, Michigan, Minnesota, and Iowa. It occurred also in Rhode Island, Alabama, and California. Doolittle reported extensive losses, ranging from 25 to 60%, in greenhouses in the Chicago district.

The variety Davis Perfect was noted as susceptible in Delaware. In Illinois one field of Klondike showed 50 to 70% of mosaic. Clayton, of Long Island, N. Y. reports no mosaic on milkweed. Pokeweed with mosaic was common and possibly was the wild carrier. Doolittle, of the U. S. Department of Agriculture Station at Madison, Wisconsin reports cucurbit mosaic on cucumber, squash, pumpkin, muskmelon, wild cucumber, milkweed, pokeweed, Physalis, and Amaranthus. Crawford reports finding mosaic on a wild cucurbit, _Apodanthera undulata_, in Otero County, New Mexico.

Recent literature

Bewley, W. F. Mosaic disease of the cucumber. Ann. Rep. Exp. & Res. Sta. Nurs. & Mark. Gard. Indus. Soc. 8: 43-45. 1923.

Doolittle, S. P. and M. N. Walker. Cross inoculation studies with cucurbit mosaic. Science 57: 477. Apr. 30, 1923. (Rev. in Exp. Sta. Record 49. Nov. 1923, and Rev. Appl. Myc. 2: 512. Nov. 1923.)

Cucurbit mosaic has been transferred to 8 genera, 23 species, and 8 botanical and 96 horticultural varieties of plants. Citrullus is the only genus proved resistant. Cucumber mosaic transferred to martynia, pepper, milkweed, and pokeweed is transmissible back to cucumber. Inoculation was by aphis transfer, crushed tissues, and expressed juice. Cucumber mosaic was transmissible to tobacco, then to pepper. The potato was found susceptible as was also pigweed (Amaranthus retroflexus), and a cultivated ground cherry (Physalis sp.)

Doolittle, S. P. and M. N. Walker. Experiments on the control of cucurbit mosaic. (Abstract) Phytopath. 14: 56. Jan. 1924. The importance of the overwintering host of cucumber mosaic varies with the locality. Pokeweed seems most important in southern Illinois. It also occurs in Indiana, and Michigan. Physalis and milkweed seem to be important in Wisconsin. After eradication of milkweed at Madison the amount of mosaic changed from 100% in 1916 to 1922 to 6% in 1923. Pokeweed eradication in southern Illinois was also satisfactory.

Walker, M. N. Physalis and cucurbit mosaic intertransmissible. (Abstract) Phytopath. 14: 56. Jan. 1924.

Angular leaf spot caused by Bacterium lachrymans EFS. & Bryan

This disease was generally prevalent in Delaware although of slight importance. It was of minor importance in Illinois, Wisconsin, Iowa, and California and was reported from Florida. In Alabama it was reported as causing a serious loss, estimated at 5%. Coons, of Michigan, says: "Angular leaf spot was the most serious disease of cucumber in 1923, doing a great deal of damage through effects on leaves of pickling varieties and in causing rot of the fruit in seed cucumbers of the greenhouse forcing varieties." Weber, of Florida, reports some success in the use of liquid Bordeaux mixture. Adams, of Delaware, noted that angular leaf spot was very severe on Davis Perfect variety.

Anthracnose caused by Colletotrichum lagenarium (Pass.) Ell. & Hals.

The anthracnose disease of cucumbers was of minor prevalence in 1923 in Massachusetts and New York. The late planted crop in Delaware suffered most, but the disease did not show up in any amount until after the harvest of the commercial crop. It was the most important cucumber disease of the year in Alabama, causing reduction in yield estimated at 10%, and being reported as affecting more or less 20% of the cucumbers in 20 cars shipped to northern markets. One very heavy infection was reported from Mississippi. It was reported as a minor transit disease in Texas. It was more prevalent than usual in Indiana, Illinois and Wisconsin, although it was not serious except locally. The disease was very severe on the variety Davis Perfect in Delaware, according to Adams.

Downy mildew caused by Pseudoperonospora cubensis (B. & C.) Rostow

This disease was less prevalent than usual in New York and confined almost wholly to Long Island. There was considerable downy mildew in New Jersey, Delaware, (2% loss), and Maryland (1% loss). In South Carolina downy mildew appeared toward the close of the season and reduced the estimated crop 30%. In Florida the loss was extensive in the southern part of the state but less in the central part. The loss for the state as a whole is set at 30%. This disease was present and locally important in Alabama, Mississippi, and Louisiana. It was reported only as a greenhouse trouble in Indiana and not at all in Ohio and Wisconsin. Harter and Weimer reported it as common and causing some damage in Garden Grove and Santa Ana, California.

Downy mildew is greatly influenced by the amount of moisture present. If moisture is plentiful, Weber of Florida states that spraying has little effect in checking the fungus. Where the rainfall was less, spraying with liquid Bordeaux mixture gave considerable protection. Check rows under similar conditions were almost a complete failure.

Other diseases

Powdery mildew caused by Erysiphe cichoracearum DC. was reported as occurring in field and greenhouse in California and causing a 3% loss. The powdery mildew in Massachusetts and Mississippi is designated as E. polygoni and said to be more destructive than usual in greenhouses. The Boston market garden district lost from 30 to 40% of the crop from this cause.

Root knot caused by Heterodera radicicola (Greef.) Müll. was reported as very important in many greenhouses in New York. Chupp says few growers sterilize thoroughly enough to kill the nematodes. The loss to cucumbers in greenhouses of California was estimated by Milbrath at 6%. In Alabama a 1% loss occurred in the field, and in Texas a 3% loss.

Leafspot caused by Septoria cucurbitacearum Sacc. was observed for the first time in Delaware, and occurred in Pennsylvania also. Other leafspots reported were Macrosporium cucumerinum Ell. & Ev., from New Jersey and Maryland; and Phyllosticta cucurbitacearum Sacc. from New Jersey. Scab caused by Cladosporium cucumerinum E. & A. was reported from New York, Pennsylvania, Michigan (total loss of crop in some fields near Grand Rapids), Wisconsin; fruit rot caused by Pythium debaryanum Hesse, from Connecticut (considerable loss in one lot in the market); Sclerotium sp., Illinois (southern blight (?), a single instance found in Sangamon County - Tehon); rot caused by Sclerotinia libertiana Fckl., Idaho; stem rot, cause undetermined, Iowa.

PUMPKIN

The pumpkin is very free from diseases. Adams reported that in Delaware downy mildew caused by Pseudoperonospora cubensis (B. & C.) Rostow was less prevalent than usual; powdery mildew caused by Erysiphe cichoracearum DC. was more common; and Cercospora cucurbitae Ell. & Ev. and Colletotrichum lagenarium (Pass.) Ell. & Hals. were found on pumpkin for the first time in that state.

SQUASH

Wilt caused by Bacillus tracheiphilus EFS. was reported coextensive with the crop in New York and causing a 2 to 3% loss. Traces of wilt were reported from Ohio, Illinois, and Iowa. This disease was reported from Kansas for the first time on squash according to Stokdyk.

Downy mildew caused by Pseudoperonospora cubensis (B. & C.) Rostow was reported in Delaware, South Carolina, Louisiana (3-5% loss due to leafspot and defoliation). In Oklahoma it was reported by Stratton as causing considerable loss after the October rains.

Mosaic (cause unknown) was serious in the vicinity of Gainesville, Florida, reducing the local production about half. Traces of mosaic were reported from Texas.

Powdery mildew caused by Erysiphe cichoracearum DC., Connecticut, Delaware; timber rot caused by Sclerotinia libertiana Fckl., New York; root knot caused by Heterodera radicicola (Greef) Müll. and wilt caused by Fusarium sp., Texas (loss from each, 2%).

WATERMELON

Anthracnose caused by Colletotrichum lagenarium (Pass.) E. & H.

This disease was one of the major causes of loss to watermelon growers in 1923, especially in those sections which experienced heavy rainfall during and just before the ripening period. Meier calls attention to the fact that in Florida the average yield per acre was reported as 175 melons as compared with 374 in 1920, 360 in 1921, and 380 in 1922; while Georgia produced an average yield of 178 melons as compared with 373 in 1920, 499 in 1921, and 310 in 1922. This reduction in yield in the two States was in large measure due to the epidemic of anthracnose, which in many fields caused complete loss. In these two States the average reduction in yield caused by this disease is estimated by Meier as 50 per cent. Moore of South Carolina reported an average reduction in yield of 30 per cent with total crop failure in some fields. Alabama, Mississippi, Louisiana, and Texas reported minor losses in the field. Losses in transit in the case of shipments from the above named states were caused by attempts to market badly pock-marked fruit. In Table 37, page 209, a summary of all Food Products Inspection records of melons shipped from four states in 1923, percentages of badly anthracnosed melons are given.

In Kansas the disease occurred as usual in the Kaw Valley, but was practically absent in the valley of the Republican River.

In New York and Delaware some difference was noted between varieties in the matter of susceptibility, the White Pearl, Irish Grey, and General Pershing being reported as very susceptible, while the long green varieties were somewhat resistant.

Meier reports that differences in susceptibility among the Irish Grey, Watson, Excell, and Rattlesnake varieties have not been evident in the commercial fields of the southern states.

Control of anthracnose by spraying with Bordeaux 4-4-50 was reported from South Carolina and from some sections in Florida. The best results were not obtained in the latter state, the prolonged rainfall preventing spray operations at the critical time. Good results were also secured in South Carolina by use of copper lime dust. Tehon of Illinois reported: "In Clark County only one field was able to withstand the attack, and this field had been planted with treated seed. It gave nearly $300 gross per acre as compared to neighboring fields, where $20 to $50 an acre was returned."

Stem-end rot caused by Diplodia sp.

With regard to stem-end rot, Meier reports as follows: "The decrease in stem-end rot, as shown by records issued by the Inspection Service on carloads of melons examined at terminal markets in 1923, is encouraging. (Table 37, page 209). As a matter of fact, inspection records have shown this transit disease to be on the decline since 1920, during which season the campaign for control, instituted by the Department of Agriculture and the Southeastern State Extension Services, was well under way. For example, in the carloads of Georgia melons inspected since that year, the following average percentages of melons with stem-end rot were found:

1920 ------	14.4%
1921 ------	0.3
1922 ------	6.2
1923 ------	3.2

In 1923, almost half of the stem-end rot found by inspectors in Georgia melons was located in six cars, each of which had 25 per cent or more of the load affected. The average for the remaining cars inspected was 1.7 per cent. A similar reduction in losses has been noted in the case of Florida shipments. This decrease of stem-end rot, as shown by inspection records, would seem to indicate a general reduction of this disease.

Since opportunities for field infection of melons have been fully as good if not better during the last five years than was the case in 1914, 1915, and 1916, when losses from the Southeast were so heavy as to constitute a real menace to the industry, it would seem that this improvement can safely be attributed to joint efforts at control by farmers, railroad men, and distributors. It seems probable that this trouble can be kept at a minimum if measures are continued to insure (1) careful handling during the harvesting and loading period in order to avoid wounds and knife cuts; (2) prompt shipment of freshly harvested melons, the stems of which have been reclipped, then treated with copper sulphate paste; (3) loading of melons relatively free from anthracnose pock-marks; and (4) the quickest possible railroad haul to distant markets.

Blossom-end rot (cause unknown)

This disease was reported as more destructive than usual in Delaware; about the same in Kentucky; Alabama, 2%; Texas, 2%; New Mexico, 2%; and less than usual in Indiana, Iowa, and Kansas (2%). The early planted fields of Delaware showed greater prevalence. Taubenhaus of Texas speaks of a loss of 2%, with the amount increased because of prolonged dry weather. Meier reports customary losses in Georgia and Florida, the Diplodia of stem-end rot as usual being frequently associated with this trouble.

Table 37. Analysis of records issued by Food Products Inspection Service on carloads of watermelons shipped from four States in 1923. (Meier)

		STEM-END ROT					ANTHRACNOSE			
	No. cars inspected	5% or over	10% or over	25% or over	Average per cent	Total number cars containing stem-end rot	5% or over	10% or over	25% or over	Average per cent
Georgia	128	28	11	6*	3.2	49	76	66	47	23.8
Florida	130	20	14	7**	3.5	43	99	91	71	35.9
Texas	22	12	6	2	7.5	18	3	2	0	1.6
South Carolina	10	3	1	0	3.2	6	3	1	1	7.0

* Almost half of stem-end rot loss due to 6 bad cars, each having 25% or more load affected. Average for other 122 cars was 1.7%.

** More than half of stem-end rot loss due to 7 bad cars, each having over 25% load affected. Average for other 123 cars was 1.6%.

Wilt caused by Fusarium niveum EFS.

Wilt in 1923 caused considerable damage in New Jersey and also in the central Mississippi Valley, Illinois, Iowa, Missouri and in the southwestern and western section of Texas, Arizona, New Mexico, and California. There was little complaint from Ohio, Indiana, Florida, Alabama, Mississippi and Kansas.

Table 38. Wilt losses and distribution in 1923.

State	Prevalence	Loss %	Notes
Md.	Same	Trace	
N. J.	In many fields	1-25	
N. C.	Minor		One specimen
Fla.	Minor		Scattered
Ala.	Minor		One report in Washington County.
Miss.	Minor		One report Lee County, Sept. 5.
La.	Slight	Same	May 30, Mansfield.
Tex.	Prevalent	10	
Ohio	Same	Slight	Sept. 14, Pleasant Plain. Prevents melon growing on large scale.
Ind.	Less		Low temperature unfavorable.
Ill.	Less	Major, 20%	July 24, Union County - most in river counties.
Iowa	More	Serious	Local in southeast Iowa.
Mo.	Moderate to heavy		Most in S. E. Mo. lowlands.
Kans.	Less	Important	Appeared later than usual.
N. M.	More	20%	July 6, Roswell, statewide. Many fields on sandy ground a failure.
Ariz.			June 8, Maricopa County. More after summer rains.
Calif.	Important	4%	Controlling factor many fields.

Other diseases

Downy mildew caused by Pseudoperonospora cubensis (B. & C.) Rostow was reported as less than last year in Delaware but caused very severe losses in late planted fields. In Louisiana it was present, but less troublesome than last year. It was noted for the first time on watermelon in California by Harter and Weimer. Milbrath says: "Downy mildew severe in coast regions of southern California. Loss in this section ranged from 15 to 70%." This report is understood to apply to both cantaloupe and watermelon.

Gummy stem blight or fruit rot caused by Mycosphaerella citrullina (C. O. Sm.) Gross. was reported as minor in New York, South Carolina, and Missouri. Moore, of South Carolina, says: "Gummy stem blight was general over the state. On Irish Grey melons it was found to cause a 20% loss; on other varieties no appreciable loss noted. Spraying with Bordeaux mixture held the disease in check but did not give a good control."

Powdery mildew caused by Erysiphe cichoracearum DC. (?) was reported by Higgins of Georgia as having spread from cantaloupes to watermelons, producing very serious loss throughout the state.

A mosaic-like trouble, cause unknown, was reported on a single plant in Houston, Kent County, Delaware and was also observed in Maryland.

Other diseases reported were leafspot caused by Phyllosticta citrullina Chester, Delaware, Florida; and by Cercospora citrullina Cke., Florida, Texas (loss 2%); leaf blight caused by *Macrosporium cucumerinum* Ell. & Ev., Delaware; bacterial wilt caused by *Bacillus tracheiphilus* EFS., Florida, Arizona; root-knot caused by *Heterodera radicicola* (Greef) Müll., Texas (prevalent), New Mexico (2% loss due to heavy infection on nearly mature plants), California (general and severe, loss 2%).

Hail injury, Kansas (caused 80-100% loss in the Garden City district of Pinney County, August 23); frost injury, Florida (destroyed plants in Sumter and Marion Counties, February 9; replanted); Georgia (March 22, damage 25%).

DISEASES OF CELERY

Late blight caused by *Septoria petroselini apii* Br. & Cav.

This disease seemed to be much less prevalent in 1923 than in the previous year except in Michigan, where it developed following September rains. This was attributed to the extensive drought which was more or less general.

Massachusetts: Appeared about July 1. General but not serious. Too dry for extensive development. (Osmun)

Connecticut: Less. Appeared September 29 at Wethersfield. Chiefly on self blanching varieties - Paris Golden, Golden Self Blanching. Thorough repeated spraying with Bordeaux will, in my opinion, largely control this trouble even on the susceptible varieties. (Clinton)

New York: Always important. Loss 3 to 7%. Appeared June 13, Tompkins County. (Chupp)

New Jersey: The late blight disease was not serious this year. It caused slight loss in irrigated fields, where infection occurred in isolated areas. (Poole)

Pennsylvania: General; Golden Self-blanching the most susceptible variety. (Nixon)

Delaware: Very little of the disease found this season; it was the most important disease of celery last year. (Adams)

Ohio: Where celery is grown in continuous culture gardeners find it well worth while to spray because this disease may be expected every year. (R. C. Thomas)

Illinois: Slight except under overhead irrigation. Loss a trace. (Tehon)

Michigan: Very destructive; reduction in yield 50%, 100% loss to last crop around Kalamazoo. Epidemic began in early September following extremely wet weather. Spraying fairly successful. (Coons)

California: Blight very severe in Sacramento Valley, and Los Angeles and San Diego Counties. Loss about 4% in state. (Milbrath)

Other states reporting the presence of the disease, mostly in slight amounts, are New Hampshire, Florida, Minnesota, Colorado, and Washington.

Recent literature

Coons, G. H. Celery blight or leafspot. Quart. Bul. Michigan Agr. Exp. Sta. 5: 190-193. May 1923.

Early blight caused by Cercospora apii Fr.

Early blight was noted in New Hampshire, Massachusetts, Connecticut, New York, New Jersey, Delaware, Florida, Texas, Ohio, Indiana, Michigan, and Missouri. It was of little economic importance except in Delaware where Adams says it was the most important disease of the crop. Fordhook and Golden Self-blanching were severely attacked. Winter King was slightly attacked in Indiana where Gardner said the disease killed the outer leaves, and in Florida. In New Jersey the disease occurred in artificially watered fields and in Missouri in unsprayed fields. Weber, of Florida, says this is one of the most serious diseases of celery in the state, and is not being effectively controlled in the field. Wet Bordeaux mixture has given better control than the dust unless the latter was applied in such large amounts as to make its cost prohibitive. The severity of early blight in Florida was associated with the particulary warm weather during the early growing season.

Yellows caused by Fusarium sp.

This disease was reported from New York as common in Wayne, Monroe and Livingston Counties. In Ohio it was serious in some truck sections. As expected from the weather records there was less celery yellows in Indiana than usual owing to the rains and lower temperature. The soil around Goshen, LaFayette, and Indianapolis is becoming infected. Two new locations at Hudsonville and Holland were noted by Coons in Michigan. Yellows was also noted in Minnesota and Colorado. The Golden Self-blanching variety was reported most susceptible in New York and Indiana.

Other diseases

Black heart, cause unknown, is reported by Weber as one of the most serious and baffling celery diseases of Florida. It was very serious at Sanford, causing the total loss of several fields of 5 to 15 acres. In most cases it showed up rather late. It sometimes created an entrance for slimy or watery soft rot.

Damping-off caused by several fungi, chiefly Pythium and Rhizoctonia, caused considerable damage in seed beds near Bradentown and Sanford, Florida. Losses ranged from 5 to 40%.

Soft rot caused by B. carotovorus Jones was reported in New Jersey as less destructive than for the past five years. The dry weather in the growing season was the biggest factor in its control. Soft rot was also reported in Ohio and Washington.

Root-knot caused by Heterodera radicicola (Greef) Müll. was reported as present in New York and Michigan and as more than usually severe in Florida. Foster located nematode galls August 20 at Sanford, Florida and said on September 15, 1923:

> "It is almost impossible to find a seed bed that has not a certain degree of nematodes present and in some instances every plant is affected. So far, not a single grower has adopted any of the preventive measures to control nematodes."

Bacterial blight caused by Bacterium apii Jagger, New York, Michigan; Sclerotinia libertiana Fckl. causing watery soft rot, New York (common in storage houses, loss 2 to 5%), causing pink rot of roots, Florida; mosaic, cause unknown, New York (Tompkins County), California (Delta region); reddening due to low temperature, Washington; stem cracking, cause unknown, Michigan (Manchester, very severe).

DISEASES OF LETTUCE

Drop caused by Sclerotinia libertiana Fckl.

This disease is common in greenhouse lettuce in the northeastern and central states and sometimes causes serious damage. In the South, where it occurs in the field crop, it is considered very serious. In Florida, Weber reports at Sanford 30% loss, Orlando 20%, Oakland 35%, Ellenton 15%, Gainesville, 15%, Palatka 20%, and Quincy 15-20% loss. Other states reporting lettuce drop are Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, North Carolina, Florida, Ohio, Indiana, Illinois, Minnesota, New Mexico and South Carolina.

Recent literature

Krout, W. S. Control of lettuce drop by the use of formaldehyde. Jour. Agr. Res. 23: 645-654. Feb. 24, 1923.

Beach, W. S. Some new methods and results in the control of lettuce diseases with formaldehyde. (Abstract) Phytopath. 14: 28-29. 1924.

Downy mildew caused by Bremia lactucae Regel

Downy mildew was reported as about the same or less than usual from Massachusetts, New York, Florida, Ohio, Indiana, Illinois, Iowa, Colorado, and

California. In Massachusetts, Ohio, Indiana, Illinois, and Iowa it is a greenhouse disease only. Losses are reduced to a minimum because of the use of modern greenhouse construction, which renders ventilation easy and satisfactory. The disease is an important problem, both in the field and in transportation, in California, according to Milbrath (2).

Chupp, of New York, reports mildew worse on crisp types such as hybrids and Iceberg.. In California Iceberg is said to be resistant. According to Milbrath (2) and Jagger (1) the variety New York or Los Angeles Market, largely planted in California, is frequently called Iceberg in eastern markets. This variety is very susceptible to downy mildew, whereas the true Iceberg is highly resistant, but is also much inferior in quality.

In Florida the fungus was found on the wild cudweed which undoubtedly plays an important role in harboring the fungus where lettuce is not in cultivation.

Milbrath (2) states that he has observed zoospore production which had not been recorded for Bremia lactucae previously.

Recent literature

1. Jagger, Ivan C. Immunity to mildew (Bremia lactucae Reg.) and its inheritance in lettuce. (Abstract) Phytopath. 14: 122. Feb. 1924.

2. Milbrath, D. G. Downy mildew on lettuce in California. Jour. Agr. Res. 23: 989-994. 1923.

Grey mold caused by Botrytis cinerea Pers.

This is reported as a greenhouse trouble in Connecticut, New York, Pennsylvania, Ohio, Minnesota, Iowa, and Washington. It is not usually destructive where humidity and temperature are under control. Thomas, of Ohio, says: "The third crop of lettuce of the winter season is generally most seriously affected." In New York, North and South Carolina, and Washington grey mold is also reported as a disease found in the field. Ludwig, of South Carolina, reports: "Serious epidemic in the Beaufort lettuce producing district following a freeze which occurred when the lettuce was nearly headed. Later maturing part of the crop was less affected." Probable loss in South Carolina, 5%, North Carolina 3%, Minnesota 5%, New York trace. Heald, of Washington, says grey mold is much worse in the cloudy weather of early spring.

Bacterial diseases

Rosette disease caused by Aplanobacter rhizoctonia Thomas was reported as more or less general in Ohio and present in greenhouses in Tompkins County, New York.

Soft rot or leaf rot caused by Bacillus carotovorus Jones was reported as minor in Connecticut but becoming more important each year in Idaho. A leafspot thought to be caused by undetermined bacteria was reported by Weber of

Florida. Weber also reported black rot caused by Bacterium sp. as one of the worst lettuce diseases of the state. The damage reported was: Oakland, 1-3%; Orlando, 4%; Gainesville, 5%; Micanopy, a ten acre field with over 90% loss.

Edgerton, of Louisiana, reported: "Bacterial rots are common as usual. Lettuce that was not off before the warm weather was quite severely injured."

J. T. Rosa observed near Salinas and Watsonville, California a large amount of bacterial slime which in many cases caused complete loss of the crop, June, July, and August. The land had never before been planted to lettuce.

Recent literature

Smith, R. E. and E. H. Smith. Bacterial slime disease of lettuce. (Abstract). Phytopath. 14: 122. Feb. 1924.

Bottom rot caused by Rhizoctonia sp.

This disease was reported from greenhouses in Ohio, Indiana, and Illinois; in the fields of Wayne County, New York. It was less serious than usual in New York and more so than usual in greenhouses in Ohio. The rosette type of the disease caused by Rhizoctonia was common in seed beds in Ohio. It was also reported as serious in the Station greenhouses at Urbana, Illinois.

Tip burn (non-parasitic)

The tip burn trouble in lettuce was more severe than usual last year, causing a 25 to 30% loss in New York and 20% in North Carolina. It has been found most severe following exceptionally hot days and on soil that has been heavily fertilized, especially with nitrate of soda. It was also noted in Idaho and California.

Other diseases

Rio Grande disease, cause unknown, was reported as a trace from Texas. A disease of similar appearance was reported by Chupp of New York as very common and probably caused by insects, of which the tarnished plant bug is most important.

Stunt caused by Pythium sp. was fairly prevalent in New York in June, but disappeared with advent of dry weather. Stunting of the plants in Indiana is attributed to excess of soluble salts in the soil.

Leafspots caused by Septoria spp. were reported as follows: S. consimilis E. & M., New York (worse on certain hybrids - Cos X Boston; quite severe in the seed plots); S. lactucae Pass., North Carolina, Illinois, (infection followed in moist periods by rots which considerably reduce the sale value of the crop); species undetermined, Delaware.

A new leafspot is described from the Philippine Islands by Welles as due to Cercospora lactucae.

Anthracnose caused by Marssonina panattoniana (Berl.) Magnus, Florida;

leafspot caused by Phyllosticta sp., South Carolina; black mold caused by Macrosporium cladosporioides Desm., Florida; rust caused by Aecidium sp., Minnesota (reported from the same state in 1912 also); root rot caused by Ozonium omnivorum Shear, Texas; root knot caused by Heterodera radicicola (Greef) Müll., in greenhouses in Ohio (serious; difficult to control), and Indiana (serious in one greenhouse); slimy rot, cause undetermined, South Carolina (appearance of plants suggested grey mold but no sclerotia were present or produced in damp chamber); mosaic, cause unknown, New York, New Mexico (common and very important on the winter crop); chlorosis caused by too much lime in the soil, Texas.

Frosts which occurred on several occasions in January and March did more or less damage to the early crop in Florida, Texas and California. It is thought that the chilled leaves offered a favorable entrance for many fungi associated with rots.

Recent literature

1. Newhall, A. G. Seed transmission of lettuce mosaic. Phytopath. 13: 104-106. Feb. 1923.

2. Salmon, E. S. and H. Wormald. The "ring spot" and "rust" disease of lettuce. Jour. Min. Agr. Gt. Brit. 30: 147-151. May 1923.

3. Welles, Colin G. Leafspot of lettuce. Phytopath. 13: 289. 1923. A new leafspot of lettuce produced by a species of Cercospora tentatively designated Cercospora lactucae n. sp. reported from Phillipine Islands.

DISEASES OF PEA

Pea diseases in general were very much less destructive in 1923 than in 1922.

Root rot caused by various fungi

Several fungi, including Fusarium sp., Pythium debaryanum Hesse, Rhizoctonia solani Kuhn, Aphanomyces sp., and Thielavia basicola (B. & Br.) Zopf., are reported as causing root rot of peas..

Connecticut: Thielavia, Rhizoctonia and Pythium reported; severe locally. (Clinton)

Massachusetts: Rhizoctonia and Fusarium general as usual. (Osmun)

New York: Pythium and Rhizoctonia important locally where there is lack of rotation or drainage. Not likely to be serious in carefully managed fields. (Chupp)

New Jersey: Losses average 25%; same as usual in Camden and Burlington Counties, and increasing in Cumberland County, especially on light soils. Some fields on heavy soil practically free from rot. Great reduction in canning acreage due to root rot and aphids. (Poole)

Delaware: Less prevalent and of little importance this year. Loss 5%. (Adams)

Maryland: About same as usual or more. Strains of Early Alaska selected for resistance appear promising. (Temple)

Florida: Pythium caused considerable loss near Palm Beach and Interlachen. The loss in a field near Micanopy amounted to 90% of the stand. (Weber)

Ohio: Numerous cases of a type of root rot apparently seed-borne. Losses vary from 5 to 30%. (Thomas)

Wisconsin: Aphanomyces sp. and others. Much less loss than last year, associated with low rainfall and high temperature. More in eastern section where rains occurred. (Vaughan)

Utah: Rhizoctonia, Pythium, and Aphanomyces especially severe in Morgan and Weber Counties. Also found in Utah, Davis, Boxelder, and Salt Lake Counties. Relative importance of fungi not clear, Aphanonyces may rank first. (Richards)

The Fusarium which causes root rot of peas is described by F. R. Jones (1) as F. martii pisi, n. var. The variety is widely distributed in pea-growing sections in this country, but is less important than Aphanomyces sp. as a cause of loss. The development of the disease is favored by temperature above 18°C., but variations in the soil moisture content within limits favorable for the growth of the host apparently do not affect it.

Recent literature

Cited

1. Jones, Fred.Reuel. Stem and root rot of peas in the United States caused by species of Fusarium. Jour. Agr. Res. 26: 459-475. Dec. 8, 1923.

Not Cited

Richards, B. L. Soil temperature as a factor affecting the pathogenicity of Corticium vagum on the pea and the bean. Jour. Agr. Res. 25: 431-450. Sept. 15, 1923.

Stone, R. E. Root rot and blight of canning peas. (Abstract). Phytopath. 13: 293. 1923.

Other diseases

Blight or pod spot caused by Mycosphaerella pinodes Berk. & Blox. was reported from New York, North and South Carolina, Alabama, Wisconsin, and California. It apparently was unimportant except in the coast regions of the last-named state, where the loss was estimated by Milbrath as 6%.

Powdery mildew caused by *Erysiphe polygoni* DC. was the most serious disease of peas in Florida, according to Weber (reported as Oidium balsamii Mont.). In two fields of 10 and 23 acres near Micanopy the loss was 70%, and similar losses occurred in smaller fields also. In other states reporting powdery mildew it was confined to late-planted peas and was of minor importance, except locally in Alabama, where it caused 5% loss, and California, where it was severe in San Diego County and was only prevented from causing large losses by constant sulfuring. In addition to the states already mentioned, powdery mildew was reported from Connecticut, New York, Colorado, Utah, and Washington.

Bacterial blight caused by *Bacterium pisi* (Sackett) EFS. occurred in Indiana greenhouses where it was apparently introduced with the seed. It was less important than usual in Wisconsin and more so in Minnesota. Milbrath reported it as very severe and causing losses ranging from 2 to 15% in San Mateo and Santa Clara Counties, California.

Black leaf, caused by *Fusicladium* sp. and *Phyllosticta* sp., was reported from Utah for the first time. It was abundant in Cache and Morgan Counties, but is not usually important as it appears late in the growing season.

Downy mildew caused by *Peronospora viciae* Berk., Florida (widespread on young plants after they had been injured by frost), Wisconsin, California; *black mold* caused by *Alternaria* sp. Florida (serious near Gainesville, attacking both pods and vines, and resulting in 20% loss); *leafspot* caused by *Septoria pisi* West., Delaware, Wisconsin; *mosaic*, cause unknown, California (caused severe loss in Salinas Valley during July); *rough pods* or *intumescences*, cause unknown, Washington.

Frost did considerable damage to the winter crop both in Florida and California. *Drought* caused dwarfing and resulting short crop in Wisconsin. *Scald* due to extremely high temperatures in mid-June caused considerable loss in Ohio.

DISEASES OF COTTON

Anthracnose caused by *Glomerella gossypii* (S.) Edg.

Anthracnose was more prevalent in 1923 than for several seasons in Alabama (5%), Mississippi (4%), and Louisiana (5-8%). This increased amount of anthracnose was evidently associated with an excessive rainfall in the states named. About the same amount as usual occurred in North Carolina (4%), South Carolina (1%), Florida, Texas (1%), and Arkansas (1%). Miles reports that in certain fields in the northern part of Alabama 80% of the bolls rotted. Fant, of North Carolina, considers the general reduction of losses from this disease over those occurring 10 to 15 years ago as due to the introduction of new and improved strains of cotton. It has been suggested that two factors may be involved in this reduction, namely, the resistance of the new strains to anthracnose, and the fact that greater freedom from disease has been secured through selection in the process of improvement.

Dates of first appearance are: April 27, Charleston, South Carolina; April 30, Washington County, Mississippi; and May 3, Baton Rouge, Louisiana.

Recent literature

Lipscomb, G. F. and G. L. Corley. On the vitality of cotton seed. Science 57: 741-742. June 29, 1923.

"We have found that by thoroughly drying and heating cotton seed in a vacuum ......to prevent oxidation of the fats and proteins in the seed they will endure the temperature of boiling water for hours without affecting their vitality. This treatment has completely destroyed the fungus anthracnose. Very highly infected seed of the Weber 49 variety was used in all experiments."

________________ A new treatment of cotton seed to destroy anthracnose. Amer. Fert. 18: 32-34. 1923.

Ludwig, C. A. Studies of anthracnose infection in cotton seed. (Abstract) Phytopath. 14: 52. Jan. 1924. Anthracnose infected cotton seed gradually becomes clean after being stored for a considerable time. It is safe to use the third spring after gathering. The greatest reduction in infection occurs during the autumn when the seed is about a year old.

Wilt caused by Fusarium vasinfectum Atk.

Wilt was more prevalent than usual in Arkansas (5% loss), and Louisiana (severe). The reduction in yield in other states was about the same as usual. North Carolina (3%), South Carolina (2%), Florida (worst disease), Alabama (3%), Mississippi (3%), and Texas (2%). The dates of earliest appearance reported are June 20, Pitt County, North Carolina; June 28, Oktibbeha County, Mississippi; July 2, Los Cruces, New Mexico; July 10, Oconee, South Carolina; and July 11, Montgomery, Louisiana. In several cases it is noted as more severe on light soils than bottom lands. In South Carolina wilt is actively invading the Piedmont, where it is new; and in North Carolina also it is gradually becoming more abundant, according to collaborators. Miles reports losses in one field as high as 75%. Young, of Arkansas, says there is often sufficient recovery to permit an average number of bolls to mature. Neal and Barker of Mississippi, list the following resistant varieties: Delta 6102 and Express 350, also Sealsbury, fairly resistant among long staple. Lewis 63, Tri-Cook, Miller, Covington-Toole, Acala 5, resistant short staple. Fant, of North Carolina, notes that Dixie-Triumph is highly wilt resistant and has the added advantage of being of value for growing under boll weevil conditions and that many farmers are planting this variety exclusively.

Recent literature

Elliott, J. A. Cotton wilt, a seed-borne disease. Jour. Agr. Res. 23: 387-393. 1923.

Angular leafspot caused by Bacterium malvacearum EFS.

Angular leafspot continues to be one of the widespread diseases of cotton.

In general, it was about as prevalent in 1923 as in previous years, with the exception of South Carolina where there was more on the Coastal Plain, and Texas where the greatest damage was done early. The late summer drought seemed to check the disease.

The losses from and distribution of the disease are given in the following table. The report from Illinois is of particular interest. According to Tehon, "Cotton growing is undergoing a great boom in southern Illinois with an estimated prospect of 12,000 acres in 1924. Angular leafspot has caused minor damage thus far."

Table 39. Cotton angular leafspot losses and occurrence

State	Loss %	Earliest date	State	Loss %	Earliest date
N. C.	1		La.	same	July 10
S. C.	5	July 7	Tex.	9	
Ga.	same	June 24	Ark.	5	
Fla.	2		Mo.	present	
Ala.	1		Ariz.	heavy	Mar. 30
Miss.	same	June 15	Ill.	present	July 26

Brown and Gibson (1) have successfully inoculated the Arizona wild cotton (Thurberia thespesioides) with the angular leafspot organism.

Recent literature

1. Brown, J. G. and Frederick Gibson. A new host for Bacterium malvacearum. Phytopath. 13: 455-457. Oct. 1923.

Root rot caused by Ozonium omnivorum Shear
(Phymalotrichum omnivorum (Shear) Duggar)

Root rot was reported from approximately the same areas in Texas and Arizona as in 1922. Taubenhaus estimates a 12% loss in the black lands. Brown, of Arizona, says: "Loss reported as 4% in Yuma County amounting to 800 acres. Less serious in Maricopa and Pima Counties. It was not reported until late in the season, i. e. August 15-20. The late appearance was probably due to climatic conditions."

Recent literature

King, C. J. Cotton root rot in Arizona. Jour. Agr. Res. 23: 525-527. 1923.

"Ozonium omnivorum fruits abundantly at Sacaton, Arizona. The fungus spreads in a "fairy ring" and the fruiting bodies are found abundantly on moist soil at the margin of the ring. A felt-like mat is formed 15-25 cm. outside the outer circle of recently wilted plants. Cotton plants were infected by placing diseased roots beside healthy ones and also by inoculation with mycelium from pure culture. Spores are germinated with difficulty and have not been used successfully as a medium of in-

> fection. Progress of the rings has been stopped by saturating the soil at the periphery of the ring with 1 part commercial (40 per cent) formaldehyde to 100 parts water. In alfalfa fields the zone of disinfection must be about 75 cm. outside the line of wilted plants and in cotton fields 150 cm. D. Reddick. (Bot. Absts.)

Taubenhaus, J. J. and D. T. Killough. Texas root rot of cotton and methods of its control. Texas Agr. Exper. Sta. Bul. 307: 1-98. Apr. 1923.

Root knot caused by Heterodera radicicola (Greef) Müll.

Root knot caused a reduction in yield in North Carolina of 2%, Alabama trace, Mississippi trace, Texas 1%, Arkansas 2%, New Mexico 2%. Miles says that it was more general in Alabama than is commonly assumed. Cotton suffers severely on some of the light, sandy soils. Neal and Barker note that a heavy local infection of nematodes in Pearl River County, Mississippi was adjacent to an infested peach orchard.

Other diseases

Damping-off or sore shin due to Rhizoctonia sp. was reported from Georgia, Florida, and Arizona as more serious than usual owing to wet weather in the early part of the season. Weber, of Florida, states:

> "In a large number of fields in Columbia and Alachua Counties the stand was reduced 30-60%. A forty acre field in Columbia county was a total loss. Near Gainesville several fields showed 50% loss in killed seedlings. Replanting was carried on in most fields in the cotton growing section."

Leafspot caused by ~~Asochyta~~ Ascochyta gossypii Sydow was collected at Clemson College, South Carolina. This disease has only been reported heretofore from Arkansas.

Black rust caused by Macrosporium nigricantium Atk. was reported as worse than ever before known in South Carolina. It was more prevalent in the eastern than western sections, and caused a loss estimated at 2%. It was first observed August 30 at Chester. Moore states that black rust was found on soil previously in alfalfa. It was also reported from Florida.

Boll rot caused by Diplodia gossypina Cke. was reported as more serious than usual in South Carolina and Arkansas. Its occurrence was associated with extremely wet weather.

Fertilizer injury caused by excessive use of sodium nitrate resulted in a parched and leathery condition of the leaves; reported by Neal and Barker of Mississippi.

Other diseases and injuries reported were leafspot caused by Cercospora gossypina Cke., South Carolina, Florida, Texas, and Oklahoma (Mycosphaerella stage) probably occurred in every cotton growing state; rust caused by Puccinia hibisciata (Schw.) Kellerm. (Aecidium gossypii Ell. & Ev.), Texas (0.5% loss in the Rio Grande Valley), Arizona; boll rot caused by Olpitrichum carpophilum Atk., Louisiana; albino plants, New Mexico (a few plants of one variety showed this condition, the cause for which is unknown); lightning injury, South Carolina; poor stands due to damping-off favored by cold damp weather in early spring, Arkansas.

Recent literature

Ballard, E. and Dorothy Norris. Bacterial infection of cotton bolls. Agr. Jour. India 18: 40-49. Jan. 1923.

Disease due to a bacterium which is not *B. malvacearum*; insects appear to play a large part in the dissemination of the disease.

Crawford, R. F. Fungi isolated from the interior of cotton seed. Phytopath. 13: 501-503. Nov. 1923.

Skinner, J. J. and F. E. Allison. Influence of fertilizers containing borax on the growth and fruiting of cotton. Jour. Agr. Res. 23: 433-443. 1923.

DISEASES OF SUGAR CANE

(Prepared by E. W. Brandes)

Mosaic (cause undetermined)

Mosaic continues to attract attention in the cane producing sections of Louisiana, Georgia, Florida, Mississippi, Porto Rico, and Philippine Islands. It has now been reported from practically every cane producing region of the world. This disease is not considered as dangerous as it was a few years ago, since marked progress has been made in securing highly resistant or immune varieties or strains. Edgerton, of Louisiana, estimates a reduction of five to ten per cent in cane yield because of mosaic. Weber, of Florida, reports that the State Plant Board is directing the growing of a variety of sugar cane of the Uba type, "Cayana-10", which was supplied by the U. S. Department of Agriculture. This variety is immune to mosaic. At the present rate of progress the disease will be eliminated from the state in a few years.

The Office of Sugar-Plant Investigations, Bureau of Plant Industry, undertook a thorough exploration of the Orient during the winter of 1922-23 for the purpose of securing varieties immune to mosaic. Varieties in which no infection was found were located in Formosa, the Philippines and Java. These are being tested this year in Louisiana and Florida and are also being used for crossing with our established varieties. The breeding work is being carried on at the Sugar Cane Field Station of the Department of Agriculture at Canal Point, Florida.

Recent literature

1. Weber, G. F. Field work in Florida during the year on disease control. The Quar. Bul. of the St. Pl. Bd. of Florida 8 (1): 1-8. Oct. 1923.

2. Sample, D. M. Mosaic disease causes heavy losses. Sugar Centr. and Plant News 4: 140. Mar. 1923.

3. Hind, R. Renton. Toledo cane, a mosaic immune variety. Sugar Centr. & Plant News 4: 105-107, 110, 137-138. 1923.

4. Anon. New canes immune to mosaic. Facts about Sugar 16: 314. Apr. 21, 1923.

Not Cited

Barber, C. A. On insect transmission of mosaic, especially in Java. Intern. Sugar Jour. 25: 346-351. July 1923.

Brandes, E. W. Mechanics of inoculation with sugar-cane mosaic by insect vectors. Jour. Agr. Res. 23: 273-283. 1923. Literature cited: p. 283

Brandes, E. W., and Peter J. Klaphaak. Cultivated and wild hosts of sugar cane or grass mosaic. Jour. Agr. Res. 24: 247-262. 1923. About 40 species of Gramineae have been tested and the following are definitely susceptible to mosaic: Saccharum officinarum, Zea mays, Holcus sorghum, Pennisetum glaucum, Miscanthus sinensis, Saccharum narenga, Paspalum boscianum, Syntherisma sanguinalis, Chaetochloa lutescens, C. magna, Echinochloa crusgalli, Panicum dichotomiflorum, Brachiaria platyphylla. Several varieties of the slender North India type of sugar cane reputed to be immune, have been found susceptible to the disease but exhibit suppressed symptoms. Many varieties of maize when tested in southern fields proved susceptible but some are more so than others. Northern and Western varieties, which did not make a good growth, did not show the disease. Southern varieties of maize showed reduction in yield varying from 0.4 to 50 per cent on account of the disease. Aphis maidis is the only insect vector noted. Tests for seed transmission gave negative results. (D. Reddick. Bot. Absts. Abstract)

______________________________ Growth stimulation pest and disease control by hot water treatment of sugar cane "seed"-I. Louisiana Planter 71: 371-372. Nov. 10, 1923.

Data on disease control not available for preliminary report, except that hot water treatment has failed to eliminate mosaic.

Brunner, Stephen C. Mosaic and other cane diseases and pests in Cuba. Louisiana Planter 70: 452-455. The mosaic disease of sugar cane is present in many localities in Cuba but it does not seem to be spreading as rapidly nor doing as much damage as in some other countries like Porto Rico. The Crystalina cane, the variety which is largely grown in Cuba, is more resistant than many varieties. It is believed that the disease is not a menace to the Cuban sugar industry and that it can be controlled satisfactorily with immune and resistant varieties. Other cane diseases are mentioned very briefly. (C. W. Edgerton, Bot. Absts.)

Chardon, C. E. Report of the special pathologist, 1921-1922. Ann. Rep. Insular Exp. Stat. Porto Rico 1921-1922. Investigations on sugar mosaic.

____________ and R. A. Veve. The transmission of sugar cane mosaic by Aphis maidis under field conditions in Porto Rico. Phytopath. 13: 24-29. 1923.

Earle, F. S. Experiences with mosaic disease. Uba found to be immune in Cuba. South African Sugar Jour. 7: 427-428. 1923.

____________ Mosaic disease danger. Prompt action needed to stop its spread in Cuba. Facts About Sugar 16: 230-231. 1923. The mosaic disease of sugar cane is spreading rapidly in Cuba and very little is being done to control it. In Porto Rice, the disease is being controlled by seed selection and rogueing. (C. W. Edgerton, Bot. Absts.)

Matz, Julius. Naturaleza mosaico de la cana. (Nature of cane mosaic.) Sugar 25: 222-223. This is a discussion of the bodies found in the tissues of mosaic affected plants. (C. W. Edgerton, Bot. Absts.)

____________ Recent developments in the study of the nature of mosaic diseases of sugar cane and other plants. Jour. Dept. Agr. Porto Rico 63: 22-27. July 1922.

Page, R. L. Mosaic disease: its eradication and control. Facts About Sugar. 17: 14-15. July 7, 1923.

Root disease

Root disease (cause not determined) continues to cause considerable losses throughout the South. It is generally considered as responsible for the failure of second stubble crops and partial failure of first stubble crops in Louisiana and Georgia. (Brandes)

Seed cane deterioration

Deterioration of seed cane in windrows and banks was reported as especially destructive in southern Georgia. Numerous fungi and bacteria, among them *Colletotrichum falcatum* Went. and *Thielaviopsis paradoxa* (De Seyn) von Höhn. were isolated from the rotting cane. It was noted in Georgia that varieties of the Uba type were more severely injured than the Purple and Ribbon varieties. In Louisiana the prevalence of this type of injury and damage caused by it appeared to be greater than in the previous two years.

Other diseases

Red rot caused by Colletotrichum falcatum Went was reported as more than usual in Louisiana, loss 3 per cent, common and causing heavy losses in Florida, and only observed twice in Alabama. Edgerton, of Louisiana states that red rot was favored by a heavy borer infestation and wet weather.

Reference

Sahasrabuddhe, D. L. Investigations on the causes favoring the development of red rot of sugar cane in Gujarat. Poona Agr. Coll. Rep. No. 18. 16 p. 1922.

Leaf spot caused by Helminthosporium sacchari But. was reported as common in Porto Rico.

Rind disease caused by Melanconium sacchari Massee was reported as very slight in Louisiana but severe in Porto Rico. It was observed once by a quarantine inspector at Key West.

Leaf spot caused by Phyllosticta sacchari Speg. was reported from Porto Rico.

Dry top rot caused by Plasmodiophora vascularum Matz was reported in the roots and lower part of the cane in Porto Rico.

Reference

Matz, Julius. Dry top rot of sugar cane. A vascular disease. Jour. Dept. Agr. Porto Rico 63: 28-47. July 1923.
Most serious as far as yield is concerned, of three or four major cane diseases in Porto Rico.

Gumming disease caused by Bacterium vascularum EFS. was reported by Cook and Toro as very severe in Porto Rico.

Reference

Matz, Julius. Gumming disease of sugar cane. Jour. Dept. Agr. Porto Rico 63: 5-21. July 1922.

Recent literature

Cook, Mel. T. Root diseases of sugar cane in Porto Rico. (Abstract). Phytopath. 14: 59 Jan. 1924.

Earle, F. S. Sugar cane root disease. A neglected enemy of cane and ways of controlling it. Facts About Sugar 16: 314. Apr. 21, 1923.

Lee, Henry Atherton. Sereh disease of sugar cane in Singapore. Phytopath. 13: 145. Mar. 1923.

McWhorter, Frank P. The nature of the organism found in the Fiji galls of sugar cane. Louisiana Planter 70: 148-150. 1923. Reproduced from the Philippine Agriculturist (see Bot. Absts. 12, Entry 2644).

__________________ Cause and control of Fiji disease. Sugar Centr. & Plant News. 4: 385-389. Aug. 1923.

Tyron, H. Top rot of the sugar cane. An inquiry into the nature and origin of a disease affecting sugar cane in the Herbert River and other districts of Queensland. Queensland Bureau of Sugar Experiment Stations: Div. of Path. Bul. 1. 56 pp. 1923.

Lee, H. A. Gum diseases of sugar cane in the Philippines. Phytopath. 13: 504. Nov. 1923.

DISEASES OF SUGAR BEET

Leafspot caused by Cercospora beticola Sacc.

While leafspot was of widespread occurrence the losses resulting were probably negligible, except for certain sections such as the Arkansas Valley in Colorado. Thomas, of Ohio, says it is the most prevalent disease seen. Coons, of Michigan, says that the epidemic which was considered ready to break on July 15 was checked in early August by cool moderately moist weather. Stokdyk, of Kansas, quotes Mr. Gillespie of the Garden City Sugar Company who "believes late planting is the practical control. Beets seem to escape the attack when planted late." Richards, of Utah, says: "Leafspot cannot be considered as a serious factor in the state at present. The amount of damage in some fields, together with the possibility of spread, indicates trouble for the future." A severe general infestation of leafspot in the Arkansas Valley of Colorado was recorded by Mr. Skuderna, Experimentalist for the American Sugar Company. This disease is regarded there as a serious problem. Mr. Skuderna reports a variety of beet practically immune to Cercospora beticola. Mr. Eubanks Carsner, of the Office of Sugar Plant Investigations states that in the vicinity of Santa Ana, California a considerable amount of damage resulted late in the season from an epidemic of leafspot.

Recent literature

Takimoto, Kyosumi. On the vitality of Cercospora beticola. Ann. Phytopath. Soc. Japan 1: 43-44. 1923. English summary: p. 44.

"1. The spores of Cercospora beticola kept in dry condition at the laboratory were active for 16 months.

2. The spores infected in the seeds were able to germinate until the end of April (sowing season) of next year.

3. The spores of diseased leaves kept under caves were not able to germinate in the beginning of May, but sclerotial bodies or mycelia in tissue were alive through the winter.

4. The spores of diseased leaves placed on the soil in the fields of Suwon, lose their vitality in the beginning of May but the sclerotial bodies of mycelia in the tissue were very often able to germinate. The same result was obtained at Heijo, but a few spores on the under parts of the pile were able to germinate in the case where beet root were covered with thin layer of soil.

5. The spores of diseased leaves mixed with the wet soil died after 3 to 4 weeks, in the laboratory.

Curly-top (cause not determined)

Curly-top of sugar beets was reported by Crawford as the limiting factor in producing beets in New Mexico. He estimated that every field in the state showed the disease and placed the reduction in yield at 40%. However, the acreage planted to sugar beets in New Mexico is not large. Hungerford says curly-top was important in Idaho and reduced the yield 4%. In California the loss due to curly-top was estimated as 5.4% by Mr. Rittue, of the Office of Sugar Plant Investigations, Bureau of Plant Industry. Dr. Pack of the same office reports only moderate losses this year in Utah. Mr. Eubanks Carsner, also of this office, makes the following statement:

> "The beet leafhoppers seemed at a relatively low ebb in 1923 so that relative to other years the damage from curly-top was decreased. This applies to California only. In the Salinas Valley of California in the area around King City two small fields which were planted in March were completely ruined by curly-top while the later plantings were only moderately damaged. Usually the late planted fields in this district are badly affected. In the Sacramento Valley a very good crop of beets was raised and the damage from curly-top was much less than in many other years.
>
> "In the states other than California we have no authentic reports except from the Yakima Valley of Washington. There the curly-top damage was very serious. No complaint was heard from Utah or southern Idaho and presumably, therefore, the damage was less severe there than in some previous seasons."

Recent literature

Boncquet, P. A. Discovery of curly leaf of sugar beets in the Argentine Republic. Phytopath. 13: 458-460. Oct. 1923

Carsner, Eubanks and C. F. Stahl. The relation of Chenopodium murale to curly-top of the sugar beet. (Abstract) Phytopath. 14: 57. Jan. 1924.

"Many of the beet leafhoppers which come into the beet fields in spring are non-viriferous. Chenopodium murale is one of this insects' winter host plants. Inoculations have

> shown that this plant is very resistant to curly-top. Tests with nymphs reared on this plant from viriferous parents have indicated that usually the virus of curly-top is so attenuated by its passage through this resistant plant that it subsequently fails to cause the disease or else produces only mild cases. It seems probable that the non-viriferous leafhoppers which enter the beet fields in spring come from Chenopodium murale or plants comparable to it in relation to curly-top. Studies are in progress to determine whether or not attenuated virus can be reactivated."

Carsner, Eubanks and C. F. Stahl. Progress report on curly-top of the sugar beet (Abstract). Phytopath. 14: 122-123. Feb. 1924.

Severin, Henry H. P. Curly leaf transmission experiments. Phytopath. 14: 80-93. Feb. 1923.

__________________ Same title (Abstract). Phytopath. 14: 123. Feb. 1924.

Leafspot and rot caused by Phoma betae Oud.

This disease was reported from Minnesota, Idaho, and Utah. It was usually below the average in prevalence and destructiveness. Richards of Utah says: "This disease is accurately related in its epidemic from to the amount of rainfall during June, July and August. It occurred only in fields of poor tilth and culture, and under conditions of inadequate irrigation." The seedling rot or damping-off was reported associated with this organism in Michigan and Utah. Dr. Dean A. Pack, Salt Lake City, writes as follows:

> "In the western part of Weber and Davis Counties, Utah, Phoma appeared in very small isolated patches over an area of about 3100 acres of sugar beets. While the attack was general, appearing in nearly every field, there was probably less than one per cent injury done. This is very unusual, since ordinarily we could have looked for a loss of 20 to 30 percent of the crop in this district.
>
> "I visited the fields early in June and several times during the summer and each time noted that the disease did not spread, as it usually does."

Campanile, Giulia. Sulla Phoma betae Frank come agente della moria delle bietole nei semenzai in Italia. Boll. Mens. Inform. e Not. R. Staz. Patol. Veg. Roma. 4: 39-48. Apr.-June 1923.

Nematodes (Heterodera spp.)

Sugar beet nematode, H. schachtii Schmidt

Mr. Gerald Thorne of the Office of Sugar Plant Investigations reports as follows regarding the sugar beet nematode situation:

"New infestations found by Mr. L. A. Giddings of the Sugar Plant Office: Colorado - Sterling, Sedgwick, Julesburg, Fort Morgan, Brush, and Snyder; Nebraska - Gering; Montanta - Billings. At each of these points from one to five infested fields were found.

"Utah: From field records and other reports it is estimated that 85% to 90% of the infested areas were under crop rotation and the loss for the state probably did not amount to over 1,000 tons.

"Idaho: Only a few fields in the Preston-Whitney section suffered any loss, practically all of the severely infested fields being under rotation.

"Colorado: About 85% of the infested fields under crop rotation. Three hundred tons would probably cover the losses.

"California: Very little data available but the loss was much lower than usual due to the elimination of many of the severly infested areas.

The figures given are only estimates based on information furnished by sugar company men."

Mr. Rittue, also of the Sugar Plant Office, reported the sugar beet nematode as causing 7.8% loss in California. According to Eubanks Carsner of the same office, the nematode was especially destructive in the region around Chino, California. Brown stated that in Arizona demonstration fields for beet seed production were infested with this nematode.

Recent literature

Müller, H. C. & Molz, E. Versuche über den Einfluss der verfrucht auf den Nematodenbefall und den Ertrag der Zuckerrüben. Blätt. Zuckerrubenb. 30: 89-94. July 31, 1923.

Thorne, Gerald. Suggestions for control of nematode. Through the Leaves 1923: (March); 97-99. The Great Western Sugar Co. Longmont, Colorado, 1923. This popular article gives a brief description of the sugar beet nematode (Heterodera schachtii) with its habits and methods of control, the latter based entirely on crop rotation and prevention of infestation. (Cf. also Facts About Sugar 16: 192-193. 1923). Frederick V. Rand. (Bot. Absts.)

______________ Length of the dormancy period of the sugar-beet nematode in Utah. U. S. Dept. Agr. Dept. Circ. 262: 1-5. Feb. 1923.

Root-knot nematode, H. radicicola (Greef) Müll.

Crawford reports the occurrence of the root-knot nematode on 50% of the sugar beet acreage in New Mexico, which is limited, however, with a reduction in yield of about 5%. Rittue of the Sugar Plant Office reports this nematode as causing 3% loss in California.

Other diseases

Root rot caused by Rhizoctonia sp. was reported as less than usual in Ohio, Michigan, Wisconsin, more in Iowa and about the same in Colorado and Utah. Coons, of Michigan, says: "About 10% of early plantings plowed up on account of 'Black Root' chiefly Rhizoctonia. Late plantings though badly hit by disease with favorable weather conditions following gave good stand." In one case in Colorado the disease was severe in a field that had been flooded earlier in the season. Richards, of Utah, says: "The possible damage that might result from this disease is shown by the fact that this year two fields were found in which apparently 60% of the crop was destroyed." Rhizoctonia sp. causing root rot of sugar beet was reported from California for the first time. (Smith, E. H. Some diseases new to California. (Abstract). Phytopath. 14: 125. Feb. 1924).

Crown gall caused by Bacterium tumefaciens EFS. & Towns., Ohio, Michigan; rot caused by Fusarium sp., Washington; rust caused by Uromyces betae (Pers.) Tul., California (reported by Harter and Weimer as common); mosaic, cause undetermined, Indiana (3% loss), Kansas.

DISEASES OF TOBACCO

Wildfire caused by Bacterium tabacum Wolf & Foster

The wildfire disease which reached such alarming proportions in 1922 was much less serious in 1923. Heavy seed bed infection was noted in May in Massachusetts, Connecticut, New York and Pennsylvania, but the dry weather which followed successfully held the disease in check. Reports of the disease were also received from Maryland, Kentucky, North Carolina, South Carolina, Georgia, Florida, Southern Illinois, and Wisconsin. This is apparently the first report from Illinois. States which reported wildfire in 1922 but not in 1923 are New Hampshire and Virginia. Thomas, of New York, examined 48 seed beds in Chemung County on June 12, 1923 and found 24 healthy; of the balance 9 showed slight, 6 moderate, and 9 severe infection. The outbreak of wildfire in Georgia was traced to the use of unsterilized cloth which had been previously used in Connecticut. Johnson, of Wisconsin, reports wildfire only where the beds were near the tobacco sheds. Valleau reports that it occurred in Kentucky where the men in handling the seed beds had chewed leaves of last year's infected crop and spit the juice onto the young plants.

Recent literature

Conant, G. H. The "wildfire" disease of tobacco in Wisconsin. Wis Dept. Agr. Bul. 52: 58-66. Dec. 1922.

Anderson, P. J. and G. H. Chapman. Tobacco wildfire in 1922. Mass Sta. Bul. 213: 27. 1923.

Chapman, G. H. and P. J. Anderson. Wildfire of tobacco, 1922. Conn. State Sta. Tobacco Substa. Bul. 2: 7-38. 1922.

Johnson, James. Experiments with dusting and spraying for the control of tobacco wildfire in seed beds. (Abstract) Phytopath. 14: 50. Jan. 1924.

Johnson, James and H. F. Murwin. Disinfection of tobacco seed against wildfire. (Abstract) Phytopath. 14: 50. Jan. 1924.

Tisdale, W. B. Control of tobacco wildfire. Florida Agr. Exp. Sta. Press Bul. 349. 2 p. Nov. 1923.

Anon. To control wildfire in tobacco. Jour. Dept. Agr. South Africa 6: 480-481. June 1923. See reference under angular leafspot for further information.

Angular spot or blackfire caused by Bacterium angulatum Fromme and Murray

Angular spot or blackfire was reported from Virginia (2%), South Carolina (t), Kentucky (12%), Florida (t), Louisiana (5-7%), Indiana (t). The only states where blackfire has assumed serious proportions are Kentucky and Louisiana. Valleau, of Kentucky, says the principal means of spread is the chewing of leaves of last year's diseased crop and spitting the juice onto the plants in the seed bed. Control of the disease was secured by seed treatment and sanitation. Dark tobacco is resistant, according to Valleau, until just before it matures, but from that time on it is very susceptible. Infected leaves are ruined for wrappers but may be used for cigarettes, according to Gardner, of Indiana.

Recent literature

Ludwig, C. A. Tobacco wildfire and blackfire. Clemson Agr. Col., South Carolina. Ext. Circ. 53: 7-12. 1923.

Valleau, W. D. An important period in the life history of two bacterial organisms causing leafspots on tobacco. Phytopath. 13: 140-144. Mar. 1923.

Valleau, W. D. and Charles Hubbard. Angular leafspot and wildfire infection of plant beds by spitting. (Abstract) Phytopath. 14: 51. Jan. 1924.

Black root rot caused by Thielavia basicola (B. & Br.) Zopf.

Black root rot was reported about as usual in Massachusetts, Connecticut, Pennsylvania, Kentucky, and Florida and less than usual in Virginia, Ohio, Indiana, and Wisconsin. Mention is made of the following resistant varieties or strains: Kentucky Experiment Station resistant strain of White Burley in Kentucky; Connecticut Round Tip in Florida; Kentucky resistant Judy's Pride in Indiana; Wisconsin Resistant Havana; Hibshman and Olson largely grown in Pennsylvania are replacing the less resistant types of Leaman and Espenshade. Turkish tobacco proved almost immune in Kentucky (1), and in Georgia (2) some highly resistant strains of Sumatra have been developed. Owing to prejudice of buyers against Wisconsin Resistant Havana a new strain having superior quality is being developed. The high temperatures during early summer were largely responsible for the decrease in the amount of black root rot.

Recent literature

1. Anon. Tobacco disease investigations in Kentucky. Ky. Exp. Sta. Rpt. 1922. pt. 1. pp. 22-24. Turkish tobacco almost immune.

2. _____ Plant Diseases. Georgia Sta. Rpt. 1922. 14-16. Some highly resistant strains of Sumatra have been obtained.

3. Orton, C. R. and Otto Olson. Progress report upon the resistance of commercial strains of tobacco to root rot. (Abstract) Phytopath. 14: 51. Jan. 1924.

Mosaic, cause undetermined

Mosaic on tobacco was unusually prevalent in Wisconsin (10%) and Virginia (2%) in 1923. In the other tobacco areas it was about as usual. Reports were received from Connecticut, New York, Pennsylvania, Virginia, Florida, Ohio, Indiana, Kentucky, and Wisconsin. The disease appeared coextensive with the crop but as the symptoms appeared late in the season little damage was estimated. W. B. Tisdale, of Florida, reported that mosaic was more prevalent under shade and was evidently spread by laborers from infected to adjacent plants. Thomas says that mosaic was the most conspicuous disease of tobacco present in Ohio.

The control of tobacco mosaic by eradicating solanaceous weed carriers was given further demonstration in Kentucky. Valleau reports as follows:

> "Eradication of bull nettle and ground cherries. We have attempted to free a large tobacco bed of these weeds and have thereby obtained some interesting facts in regard to the weeds. Usually the root system consists of a straight tap root extending down 20 to 30 inches. Occasionally laterals run under the surface and parallel to it at a depth of about 6 or 8 inches. Bull nettles dug out to a depth of 16 inches and dirt filled over the remaining root are capable of sending up new shoots to the surface. The only practical means of eradication of the weeds we have found is to dig them out with an ordinary 2-jawed post hole digger. An entire root may be left intact and the dirt completely removed from about it, if care is used. If the root branches off the broken end can readily be seen in the middle of the hole. Only a few minutes is required to remove an entire root with this tool."

Recent literature

Elmer, O. H. Mosaic cross-inoculation studies. (Abstract) Phytopath. 14: 55. Jan. 1924

Walker, M. N. The mosaic disease of Nicotiana glutinosum not distinct from tobacco mosaic (Abstract) Phytopath. 14: 57. Jan. 1924.

Rawlins, T. E. and James Johnson. Cytological studies on tobacco mosaic. (Abstract) Phytopath. 14: 55. Jan. 1924.

Other diseases

Frog-eye caused by Cercospora nicotianae Ell. & Ev. was particularly severe in Kentucky where the loss was estimated at 5%. It occurred mostly on Burley tobacco. Dark tobacco was practically free from infection. The wet season is held largely responsible for the increased severity. It was reported as a minor trouble in South Carolina, Florida, Indiana and Porto Rico.

"Wisconsin bacterial leafspot" ("rust") has been described by James Johnson (2) as due to Bacterium melleum n. sp. The organism was first isolated in 1917, but is believed to have been present prior to that time. It has been observed several times since 1917 in the vicinity of Madison, and was found in one field in 1923. In other states than Wisconsin only one specimen has been collected which is certainly of the same disease. This was from Kentucky in 1919.

Black shank caused by Phytophthora nicotianae de Haan was reported by Tisdale from Florida as follows:

> "This disease appeared in many new fields and caused heavy loss. Connecticut Round Tip appears 100 per cent susceptible, while the Big Cuba shows some resistance. Encouraging results have been obtained in isolating resistant strains of Big Cuba."

Phytophthora sp. causing blight in seed beds was reported from Porto Rico. According to Cook and Toro it has not been reported previously, but the natives say that it is of periodic occurrence.

Root knot caused by Heterodera radicicola (Greef) Müll. was reported from Pennsylvania, South Carolina, and Florida. Tisdale, of Florida, states: "Practically all sandy land is more or less affected. The continued rains seemed to enable affected plants to obtain sufficient moisture to prevent much stunting."

Leafspot of unknown cause supposed to be associated with drought conditions was unusually prevalent in Virginia causing an estimated loss of 1.5%. Growers often confused it with black-fire and wildfire. Spots of this type were also reported from Connecticut, South Carolina, and Wisconsin, although in the latter state they were very rare.

Frenching was reported as of minor importance in Kentucky, South Carolina, and Florida. Tisdale, of Florida, says: "This disease occurred on one acre of a 4-acre shade. The acre affected was old land which had been cropped to corn and sweet potatoes for years, while the acreage unaffected was new land. This was the first crop of tobacco."

A new root rot due to unknown conditions is reported from Kentucky by Valleau. This rot differs from black root rot in that the roots which rot remain white or slightly pink. No causal organism determinations were made. The disease was seen both on new and old tobacco soil. Some strains resistant to black rot were not resistant to this new trouble.

Olpidium brassicae (Wor.) Dangeard was observed on the roots in a greenhouse at the University of Wisconsin. It has not previously been reported in this country (1).

Granville wilt caused by Bacterium solanacearum EFS., Virginia (locally severe in Greenville and Mecklenburg Counties); white speck caused by Macrosporium tabacinum Ell. & Ev., Ohio; brown spot caused by Alternaria sp., Ohio; wilt probably caused by Fusarium sp., Pennsylvania; stalk cankers caused by Pythium debaryanum Hesse, Connecticut; damping-off and sore shin caused by Pythium sp., and Rhizoctonia sp., Wisconsin; damping-off caused by Rhizoctonia solani Kuhn, Connecticut; sore shank due to the same organism, Virginia; drowning caused considerable loss to tobacco in Christain County in western Kentucky.

Recent literature

1. Bensaude, Mathilde. A species of Olpidium parasitic in the roots of tomato, tobacco, and cabbage. Phytopath. 13: 451-454. Oct. 1923.

2. Johnson, James. A bacterial leafspot of tobacco. Jour. Agr. Res. 23: 481-493. Feb. 10, 1923.

3. Tisdale, W. B. Progress report on Phytophthora resistant tobacco. (Abstract) Phytopath. 14: 51. Jan. 1924.

DISEASES OF MISCELLANEOUS VEGETABLE CROPS

ARTICHOKE, JERUSALEM

Wilt caused by Sclerotium rolfsii Sacc. of slight importance in Louisiana.

Powdery mildew caused by Erysiphe cichoracearum DC. was reported by Clinton as abundant October 5 at Mt. Carmel, Connecticut. Both conidial and ascospore stages were present.

ASPARAGUS

Rust caused by Puccinia asparagi DC.

This disease is not considered by collaborators to be a serious menace to asparagus culture except in limited sections in New Jersey, (Gloucester County), South Carolina and in Oklahoma and California in which latter states its occurrence is considerably localized. It was reported as present but of no commercial importance in Connecticut, New York, Pennsylvania, Delaware, Texas, Ohio, Illinois, Wisconsin, Minnesota, Iowa, North Dakota, Colorado and

Washington. The amount of rust in Ohio in previous years has resulted in the extensive use of resistant varieties. It is assumed that a similar statement could be made in regard to the rust situation in other states, if information was available.

Other diseases

Rot caused by Fusarium sp. was reported by Chupp, of New York, as causing much comment among growers. The loss was estimated at a trace to 2%.

Leaf and stem spot caused by Cercospora sp. was reported as new to California. (2).

Frost in May caused several complaints in June, according to Clinton of Connecticut. Later cuttings were not injured. The frost supplemented by hot weather in early June caused the growth to branch prematurely and remain stunted.

Reference

1. Cook, Mel. T. Dwarf asparagus. Phytopath. 13: 284. 1923.

2. Smith, E. H. Some diseases new to California. (Abstract). Phytopath. 14: 125. Feb. 1924.

BEET (Garden)

Leafspot caused by Cercospora beticola Sacc. was reported to have caused 5-10% loss in Florida, Texas 2%, Indiana 2%, Illinois 1% and to be important in some sections of Colorado. It was noted as present but unimportant in Connecticut, New York, New Jersey, Delaware, North Carolina, South Carolina, Mississippi, Louisiana, Oklahoma, Wisconsin, Minnesota, and North Dakota. In limited sections of Delaware and South Carolina some damage was recorded.

Scab caused by Actinomyces scabies (Thax.) Güssow was reported from Ohio, North Dakota, and Idaho. In no case was it of economic importance.

Crown gall caused by Bacterium tumefaciens EFS. was found on 8 specimens in a 4 acre field at M. A. C. by Coons, Michigan.

Damping-off caused by Pythium debaryanum Hesse was reported in isolated fields in New York on muck soil.

Root rot caused by Rhizoctonia sp., New Jersey.

Root knot caused by Heterodera radicicola (Greef) Müll., South Carolina, Texas (loss 3%).

Dodder, Cuscuta sp., Washington.

CARROT

Leaf blight caused by Macrosporium sp., probably carotae E. & L. was common in most sections of New York and New Jersey, but caused minor damage. In Mississippi it was very serious around the Crystal Springs trucking section in late January, in one case causing a loss of 75%, several fields were plowed up because the market would not take diseased tops. Weber, of Florida, reports the yield reduction in one field 50%. The disease was first noticed when the plants were six inches high. The disease progressed rapidly and in three weeks the entire plants were dead.

Soft rot caused by B. carotovorus Jones was reported as present in New York and Colorado. The loss was usually slight but amounted to 1% in some New York storehouses. In some houses the bacterial rot was accompanied by a Sclerotinia rot causing damage up to 2%.

Black rot caused by Alternaria radicina Meier, Drechsler and Eddy was reported only from New York where it caused a loss of 1 to 3% in many storage houses. Harter and Weimer found a rot at Compton, California, which they considered might be caused by Alternaria.

Root knot caused by Heterodera radicicola (Greef.) Müll. was reported in two gardens in LaFayette, Indiana.

Rhizoctonia disease caused by Corticium vagum Burt, New York, unimportant.

Southern blight caused by Sclerotium rolfsii Sacc., Mississippi.

CASTOR BEAN

Leafspot caused by Cercospora ricinelli Sacc. & Berl. was reported by Weber, of Florida, as general over the state and the cause of partial defoliation.

Texas root rot caused by Ozonium omnivorum Shear, reduced the yield 8% in Texas.

Recent literature

Godfrey, G. H. Grey mold of the castor bean. Jour. Agr. Res. 23: 679-716. 1923.
Sclerotinia ricini Godf.

Dasheen (Colocasia sp.)

Rhizoctonia solani Kuhn was observed at Los Angeles on August 20, by Harter and Weimer. It was not causing serious damage.

EGGPLANT

Fruit rot caused by Phomopsis vexans (Sacc. & Syd.) Harter

The fruit rot and a leaf spot caused by the same fungus caused losses in Florida, averaging 10%, in Alabama 30%, and Louisiana 37%. The crop in some fields in these states was almost a complete failure. Weber, of Florida, says no fields were found that were entirely free from the disease. This disease is also said to have caused a loss of 5% in Maryland and a trace in Iowa, and was present in New Jersey, Indiana, Missouri, and Porto Rico.

Spraying with Bordeaux for the control of leafspot is not successful, according to Miles, of Alabama. Experiments in the production of a resistant strain by crossing the commercial variety with the wild eggplant are being conducted in Florida by A. C. Foster of the U. S. Department of Agriculture.

The fungus is said by Haenseler, of New Jersey, to overwinter in seed from rotten fruits. Compost in which are found rotten fruits will also carry over the fungus under New Jersey conditions.

Other diseases

Wilt caused by Verticillium albo-atrum Reinke. & Berth. was reported only from New York and New Jersey, where it was about the same as last year. Haenseler, of New Jersey, says: "Extensive drought in some local sections caused increase in losses from wilt. The disease seems to be least destructive in quite acid soils."

A wilt not designated as to cause was also reported from Illinois, Kentucky and California.

Bacterial wilt caused by Bacterium solanacearum EFS. was reported as common in Florida causing a loss of 2 to 4%. It attacked the plants most severely just before blossoming time. It was also noted in one field at Baton Rouge, Louisiana.

Southern blight caused by Sclerotium rolfsii Sacc. was very serious in the vicinity of Gainesville, Florida, one 20 acre field lost 60% of its plants. It was especially noticeable May and June. Other diseases reported from Florida only were damping-off caused by Rhizoctonia sp., (considerable damage in seed beds); and stem rot caused by Nectria ipomoeae Hals. (Fusarium stage causing wilt at Bradentown).

Mosaic, cause unknown, and rot caused by Phytophthora terrestris Sherb. were reported only from Indiana. The mosaic occurred in a field adjacent to mosaic peppers.

Anthracnose caused by Colletotrichum sp., New Jersey, Missouri (considerable loss); leafspot caused by Macrosporium solani E. & M., New York, Alabama; stem blight or watery soft rot caused by Sclerotinia libertiana Fckl., Florida (Sanford section), Louisiana (consideragle damage in lower section from December to March);

ENDIVE

Crown rot caused by Botrytis sp. was reported from Canastota, New York. One man grew 3000 bushels of the roots, and during the warm autumn many began to rot and were covered with the Botrytis.

GANDULES PIGEON PEA (Cajanus indicus)

Rust caused by Uromyces dolicholi Arth. was reported from Porto Rico by Cook and Toro as mild and common in all plantations.

Collar rot, cause not determined, destructive in the west end of Porto Rico Island.

GINSENG

Damping-off, cause undetermined, was reported June 4 from Tuscarawas County, Ohio. It was causing considerable injury to affected seed beds.

GROUND CHERRY

Leafspot caused by *Cercospora physalidis* Ell. was reported once in Ohio.

Mosaic, cause unknown, was reported in central and southern New Jersey. Crawford, of New Mexico, says that mosaic is common on species of wild perennial ground cherry such as *P. longifolia*, *P. lanceolata*, *P. cinerascens*, and *P. comata*.

White smut caused by *Entyloma australe* Speg. was reported from New York by Whetzel on July 19 on *Physalis pruinosa*. (Pl. Dis. Reporter 7: 58. Aug. 15, 1923). On August 10 it was collected in Nassau County on *Physalis francheti* by Mills.

HEMP (Cannabis sativa L.)

Stem blight caused by *Fusarium* sp. was reported by L. H. Dewey, of the Office of Fiber Plant Investigations, from the farm of Major W. S. Dunham, Wayne, Illinois.

> "Attacked by disease apparently caused by fungus beginning near the surface of the ground, causing leaves to wilt and turn brown without falling. The main stalk is discolored from the ground upward. Scattered small plants in commercial fields."

HEMP, MANILA (ABACA) (Musa textilis)

Banana wilt caused by *Fusarium cubense* EFS. was reported from the Philippine Islands. On this host the organism causes a heart rot.

Reference

Lee, H. A. and F. B. Serrano. Banana wilt of the Manila hemp plant. Phytopath. 13: 253-256. 1923.

____________________ Banana wilt and the Manila hemp plant. Philippine Agr. Rev. 16: 104-107. 1923.

LEEK

Wilt caused by *Fusarium* sp, was reported from New Jersey, August 6. The crop was completely wilted in a soft mass.

OKRA

Verticillium wilt caused by Verticillium albo atrum Reinke & Berth. caused a 30 to 40% loss on a small planting at the Illinois University Farm at Urbana. H. W. Anderson writes as follows:

> "It was certainly a disastrous disease where it occurred. This was due in part probably to the unfavorable soil situation where the okra was growing. We had an unusually wet season and water stood, at different times, for a period of several days on a portion of these plants."

Root knot caused by Heterodera radicicola (Greef) Müll. was serious locally in Alabama and Texas causing 1% loss in each state. The Italian truck gardens about Birmingham, Alabama were badly affected.

Wilt caused by Fusarium vasinfectum Atk., Florida, Alabama, Texas (loss 2%); root rot caused by Ozonium omnivorum Shear, Texas (loss 5%); leafspot caused by Phyllosticta sp., New Jersey; by Colletotrichum sp., Florida; damping-off caused by a number of different fungi, Florida (prevalent following unusual rains).

PARSLEY

Rot caused by Bacillus carotovorus Jones was reported from Florida where 90% of the plants in one garden were affected. It was not common.

Watery soft rot caused by Sclerotinia libertiana Fckl. was reported as usual from Louisiana.

Late blight or leafspot caused by Septoria petroselini apii Br. & Cav. caused slight damage in Burlington County, New Jersey.

PARSNIP

Leafspot caused by Ramularia pastinacae (Karst.) Lindr. & Vesterg. was noted in Nassau County, New York.

Leaf blight caused by Cercospora apii Fr. was noted at Wethersfield, Connecticut, no damage.

Root knot caused by Heterodera radicicola (Greef.) Müll. was noted at Wellington, Sumner County, Kansas.

PEANUT

Leafspot caused by Cercospora personata (B. & C.) E. was reported from South Carolina, Florida, Alabama, Mississippi, and Louisiana. In Florida Weber states:

> "Leafspot was the most important disease of peanuts during the

past season. The infection was found when the plants were a few inches high and continued in severity until the plants were mature when they were three-fourths defoliated."

Southern blight caused by Sclerotium rolfsii Sacc. caused losses of 1% in Florida and Texas, and was noted in Mississippi. It was said to be especially serious in Florida following the rains, and in Texas on light soils.

Root or foot rot, associated with species of Chaetodiplodia, Fusarium, and Botrytis was reported by Ludwig of South Carolina as severe at McColl, July 12, loss 10%.

Wilt caused by Fusarium sp. was reported by Weber to be causing some loss in fields near Gainesville, Florida.

Texas root rot caused by Ozonium omnivorum Shear caused 6% loss in Texas. It was present on the black lands.

Chlorosis caused by too heavy applications of lime was reported from Texas, loss - trace.

Recent literature

Anon. A new disease in peanuts. Jour. Dept. Agr. South Africa 6: 480. June 1923.

_____ New peanut disease. Jour. Dept. Agr. South Africa 7: 191. Sept. 1923. Called by some growers rosette, thought to be due to nematodes.

PEPPER

Anthracnose caused by Colletotrichum nigrum Ell. & Hals. was very important in Kentucky, found in 50% of the commercial plantings, reducing the total yield 20%. It was also serious about the Sanford district of Florida. The loss in Florida was estimated at 2%. An anthracnose attributed to Gloeosporium piperatum Ell. & Ev. was also reported from Florida at Gainesville said to be causing a 4% loss. The same fungus reported under the name Glomerella piperata (Ell. & Ev.) S. & S. was noted once in Mississippi.

Mosaic, cause not determined, was noted in New Jersey, Louisiana, Indiana, Wisconsin, New Mexico and California. Gardner, of Indiana, and Crawford, of New Mexico, both mention that it is worse on Chile pepper than on other varieties tested. The loss in Louisiana was estimated at 5-10%. In Santa Ana County, California, Harter and Weimer found the mosaic very serious and fairly common at Stanton.

Wilt caused by Fusarium sp. was reported as serious near Wauchula, Florida but not common in other trucking sections of the state. It was reported by Brown, of Arizona, as causing a 35-50% loss on 300 acres north of Tucson. Crawford reported the wilt as more prevalent than usual in New Mexico, reducing the yield 25%. He states that the wilt was most severe on Chile and that their selection No. 9 was somewhat resistant. There was no evident relation between soil moisture and the amount of wilt.

Fruit spot caused by Macrosporium sp. was reported from New Jersey, Florida, Wisconsin, Missouri, and California. Weber, of Florida, says:

> "Proved to be the worst disease of pepper during the past season. The fungus attacks all injured fruits, caused by mechanical injury, insects or sunburn. In many fields 60% of the fruits were unmarketable. Estimated loss of 10% attributed to this disease."

In Wisconsin it was abundant and destructive on sweet pepper and only slightly troublesome on hot peppers.

Bacterial leafspot caused by Bacterium vesicatorium Doidge was reported by Weber as very destructive near Gainesville, Florida where a field of 800 plants were almost all killed. It was not reported elsewhere in Florida, and only a trace in Indiana.

Leafspot caused by Cercospora capsici Heald and Wolf was very common in Florida, according to both Weber and Foster. Three per cent loss from this cause is Weber's estimate. It was also reported as minor in Texas and severe in Porto Rico.-

Bacterial wilt caused by Bacterium solanacearum EFS., locally important in Alabama and Texas; root rot caused by Rhizoctonia sp., Florida (5% damage in seed beds), California; southern blight caused by Sclerotium rolfsii Sacc., present but not of great importance in Alabama, Mississippi, Louisiana; root knot caused by Heterodera radicicola (Greef) Müll., California (common near Stanton), New Mexico (considerable, loss 10%), Florida; grey mold caused by Botrytis cinerea Pers., Connecticut; leafspot caused by Phyllosticta sp., New Jersey; rot caused by Phytophthora terrestris Sherb., Indiana; sunburn, South Carolina, Florida, Mississippi, California; bud rot, cause unknown, Florida (important).

Recent literature

Higgins, B. B. The diseases of pepper. Georgia Agr. Exp. Sta. Bul. 141: 47-75. 1923.

RHUBARB

Leafspot caused by Ascochyta rhei Ell. & Ev. was reported on mature leaves in New Jersey, Delaware, and Indiana. No loss estimated.

Leafspot caused by Phyllosticta straminella Bres. was widespread in New York and Illinois causing an estimated loss of .5%. A first report on the leafspot was received from White of Kansas, where it was noted at Leavenworth after harvest as a severe leaf spotting. Blade rotting was reported on 5% of the plants in Nassau County, New York.

Crown rot caused by a species of Phytophthora, probably P. cactorum (Leb. & Cohn) Schr., was reported from Pennsylvania and New Jersey, and from Michigan for the first time. Godfrey reports a foot rot caused by P. parasitica rhei Godf. present in Maryland, Virginia, the District of Columbia, and Illinois, and observed for the first time in Delaware; and an unidentified species of Phytophthora from Missouri.

Literature

Godfrey, G. H. A Phytophthora foot rot of Rhubarb. Jour. Agr. Res. 23: 1-26. 1923.

SALSIFY

White rust caused by Albugo tragopogonis (DC.) Gray was reported present in New York, Pennsylvania, and Wisconsin.

Powdery mildew caused by Erysiphe cichoracearum DC. was reported as present in Connecticut and Missouri.

SPINACH

Downy mildew caused by Peronospora effusa (Grev.) Rab. was reported as the most ever seen in Connecticut and on Long Island, New York. Newhall says this unusual prevalence was due to the wet week the first part of June. The loss was 8 to 15%. Many fields were plowed under. It was reported as present in Pennsylvania and Colorado and causing 8% loss in Texas. One carload shipped to Connecticut from Texas arrived in bad shape because of wet rot following downy mildew.

Wilt caused by Fusarium spinaciae Sherb. was described as new from Idaho (1). A Fusarium wilt was reported from Texas which may be a different species according to Taubenhaus (2); and from California.

Mosaic, cause unknown, was reported from New Jersey, the District of Columbia, Virginia, and Indiana. The resistant strain of Savoy is giving good satisfaction in Indiana and New Jersey as well as in Virginia. The Victoria variety commonly grown is quite susceptible.

Damping-off of mature plants caused by Pythium sp. was severe in the fields in various parts of New Jersey, appearing about September 20. (Pl. Dis. Reporter 7: 106-107. Nov. 1, 1923).
F. C. Meier of the Office of Cooperative Extension Work of the Department of Agriculture observed a similar trouble in a field in the vicinity of St. Paul, Minnesota.

Damping-off caused by Pythium sp. and Rhizoctonia sp. was reported by Beach as causing heavy loss in late sowings in Pennsylvania.

Root rot caused apparently by Rhizoctonia sp., the only pathogene associated with the disease, was severe locally in Delaware, according to Adams.

Anthracnose caused by Colletotrichum spinaciae E. & H., Texas; leafspot caused by Cercospora flagelliformis E. & H., Delaware; prematuring caused by hot weather, Connecticut; frost injury, Florida, Texas.

Recent literature

1. Hungerford, C. H. A Fusarium wilt of spinach. Phytopath. 13: 205-209. May 1923.

2. Taubenhaus, J. J. Studies on Fusarium wilt of spinach in Texas. (Abstract). Phytopath. 14: 29. Jan. 1924.

SPINACH, NEW ZEALAND

Leafspot caused by Cercospora sp. was reported by Gardner from LaFayette, Indiana. This spinach is Tetragonia expansa and is unrelated to the common spinach, Spinacia oleracea.

SWISS CHARD

Leafspot caused by *Cercospora beticola* Sacc. seemed to be coextensive with the crop being reported from Connecticut, New York, South Carolina, Texas, Illinois, and Colorado. The losses were usually minor although Tehon of Illinois notes one instance with beets next to chard where there was severe infection and 50% loss.

TANGO (Chrysanthemum coronarium)

This plant, used as a vegetable, has been found affected by *Bacterium solanacearum* EFS. in the Philippine Islands, according to Welles and Roldan. (Phytopath. 13: 488-491. Nov. 1923).

UDO (Aralia cordata)

J. L. Weimer (1), reports two diseases of udo, a *root rot* caused by *Sclerotinia libertiana* Fckl. and a *wilt* caused by *Verticillium albo-atrum* Reinke & Berth.

Literature Cited

Weimer, J. L. A root rot and wilt of udo. (Abstract). Phytopath. 14: 124. Feb. 1924.

WONDERBERRY (*Solanum nigrum guineense*)

Wilt caused by *Fusarium* sp. was found causing the death of plants at Kinkel, Florida by Weber.

YAUTIA (Xanthosoma sp.)

This crop which is extensively grown in Porto Rico is said by Cook and Toro to be affected by two root rots of unknown cause which they are investigating by root rot caused by *Sclerotium rolfsii* Sacc., and by two leaf spots caused by *Macrosporium* sp. and *Phyllosticta colocasia*.

Reference

Cook, M. T. and R. A. Toro. A Sclerotium disease of Yautia. Phytopath. 14: Abs. Cincinnati Meeting 1923. 1924.

Miss Florence Hedges,
Laboratory of Plant Pathology,
U. S. Department of Agricultu
Washington, D. C.